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The Mortality of Alcohol

A Statistical Approximation of the Deaths
in the United States in Which Alcohol
May Figure as a Causative or
Contributory Factor

By

EDWARD BUNNELL PHELPS, M. A., F. S. S.

Author of "War Risks," "Tropical Hazards,"
"A Statistical Study of Infant Mortality,"
"Nine Years of American Mortality
Statistics," "Neurotic Books and
Newspapers as Factors in
the Mortality of Suicide
and Crime," etc.

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THE MORTALITY OF ALCOHOL

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INTRODUCTION

THE literature of alcohol and alcoholism has so expanded of late years, and has now assumed such mammoth proportions, a casual examination of its bibliography might suggest that every important phase of the many-sided subject had already been thoroughly surveyed and exhaustively discussed from the pathological, physiological and sociological viewpoints. And yet, by no means the last word has been spoken as to one of the most far-reaching aspects of the problem, to wit, the actual relation of alcohol and human mortality. In fact, in so far as specific data dealing with this branch of the subject are concerned, it might fairly be said that the first word has yet to be spoken—at least in so far as the relation of alcohol and the mortality of the United States is concerned.

That alcohol is annually responsible, directly or indirectly, for a considerable number of deaths is not only a self-evident fact, but one officially recorded in the vital statistics of every civilized country. As to this primary fact there is no ground for difference of opinion. There has, however, been the widest divergence of opinion as to the approximate number and percentage of deaths properly chargeable to this factor, and unfortunately up to date there has been no scientific investigation of the subject in this country. Even the crudest tentative standards for attempting to measure this mortality have been wanting. In default of such standards, the extreme "estimates" of the prohibition and anti-prohibition writers and speakers as to the number of deaths chargeable to alcohol

have been equally valueless. As will be noted at some length on subsequent pages, several efforts to measure the alcoholic mortality were made, many years ago, by English physicians and statisticians, but no serious attempt of the kind has been made in this country; consequently no specific figures on these lines, however approximate, as to the mortality of the United States have hitherto been obtainable.

This paper is in the nature of a pioneer effort to arrive at such an approximation by means of a statistical study of the total adult mortality of the United States in the latest year for which comprehensive mortality statistics were available at this writing, namely, 1908. Obviously no reliable study of a subject so pronouncedly pathological would be possible without the co-operation of acknowledged medical authorities, and I have been so fortunate as to be favored in this work with the aid and advice of the Medical Directors of three well-known American insurance companies—two life companies, and one casualty company writing both health and accident insurance. To these three distinguished physicians, both professionally and individually interested for many years in the study of the complex relation of alcohol with morbidity and mortality, the proposed plan for a statistical study of the mortality presumably due to alcohol was submitted in detail, and by them approved. In accordance with that plan, each of the Medical Directors in question kindly furnished me with his estimate of the *percentage* of male deaths between ages 20 and 74, inclusive, directly or indirectly due to alcohol in the case of each of the 106 causes, or classes of causes, of death listed in the Bureau of the Census's Mortality Statistics for the Registration Area for 1908 which apparently had any alcoholic connection whatsoever; and the number of male deaths charged to alcohol in each case is computed on the *average* of these estimates. With these figures as a basis, the female alcoholic mortality of the Registration Area, and the total mortality of the Non-Registration

Area in which alcohol presumably figured, are worked out on certain statistical lines therewith explained in detail, and a specific approximation of the probable alcoholic mortality of the entire country is thus attained.

As will be noted by the tabular presentation of the estimates for the various causes of death, in many cases the three physicians' opinions as to the percentage of alcoholic responsibility widely vary, one of the Medical Directors in question almost invariably charging up to alcoholic influences a much higher percentage of deaths than does either of the two others. Knowing from many consultations with the physicians in question the scientific spirit in which each of them interested himself in this work of endeavoring to reduce the nation-wide discussion of the probable mortality of alcohol to a definite approximation, I have the best of reasons for believing that the pronounced variance in many of their percentage estimates in no case is to be construed as due to prejudice either for or against alcohol, but solely to differences in their respective scientific view-points. A study of the bibliography of alcohol has convinced me that the different angles from which the mortality of alcohol may be measured are substantially identical in number with the army of scientists who have grappled with the subject, some commentators seemingly viewing it from a purely clinical standpoint, so to speak, others in the light of biological investigations, and still others apparently taking both standards into account in arriving at their conclusions.

The *average* of the three Medical Directors' percentage estimates for each cause of death is therefore much more representative of the wide difference of expert medical opinion on this subject than would have been an average based on low estimates in every case. And, as will be shown by subsequent comparisons of the percentage totals thus arrived at and certain European figures deduced by entirely different methods, there is a substantial conformity in the general findings of

this investigation and the most authoritative foreign data, once allowance for the manifest differences in time and fields of observation has been made.

The comparative similarity of results in the case of the English investigation of a quarter of a century ago and my investigation of the adult mortality of the United States in 1908 would seem to establish a presumption of at least approximate correctness for the final percentage findings of this inquiry as to the relation of alcoholic indulgence with adult mortality in this country. At best, however, the results of any such inquiry can be but an approximation, and the fundamental purpose of this inquiry is to try to reduce to some specific figures the decidedly vague—if not utterly vacuous—generalizations as to the percentage and number of deaths in the United States probably due, directly or indirectly, to alcohol, which of late years have been so freely indulged in by partisans on both sides of the question.

This discussion of the subject is purely statistical, and in no sense a sociological inquiry as to the drink problem from either the prohibition or anti-prohibition viewpoint. The percentage estimates on which the *average* percentage assumption for each of the 106 causes of death in question rests are those of medical experts; the statistical results of the multiplication of the total number of male deaths in 1908 in the Registration Area of the United States between ages 20 and 74, inclusive, by the *average* of these physicians' estimates therefore are merely arithmetical findings; hence they are absolutely free from bias or sentiment of any kind. If the *average* of the physicians' percentage estimates is fairly representative of expert medical opinion in this country, as I believe it is, the statistical conclusions may be accepted as those of the American medical fraternity.

In any event, the approximation of male deaths directly or indirectly due to alcohol in the case of each of the 106 causes

of death is a specific figure, supported by the detailed enumeration of the figures responsible for that total, instead of being one of those mere will-o'-the-wisp figures which so many speakers and writers on the drink problem have the habit of launching without giving the slightest concrete reason for their particular figures. As a matter of course, any one of the estimates, or numerical conclusions based on those estimates, presented in the tables accompanying this paper is fairly open to competent analysis and discussion. If it can be proven incorrect, the sooner it is disproved the better. But, specific figures are furnished for the discussion, thereby presenting in tangible, concrete, form, such approximate facts as will make possible a serious and scientific discussion of one of the most important phases of the alcoholic problem.

CHAPTER I

MR. F. G. P. NEISON'S PIONEER INVESTIGATION IN ENGLAND IN 1850-1851

IN so far as I have been able to ascertain, the first investigation of any serious importance on these lines ever made in any English-speaking country was that conducted in England about sixty years ago, by Mr. F. G. P. Neison, a distinguished British actuary, who was still alive at last reports, and for many years had been a Fellow of the Institute of Actuaries, and also a Fellow of the Royal Statistical Society, of London. In 1841 the United Kingdom Temperance and General Provident Institution, of London, had established two sections, one for abstaining, and one for non-abstaining, policyholders, but, although this life insurance company had been doing business for about ten years when Mr. Neison took up the subject, apparently no attempt had been made to calculate even an approximation of the mortality in which alcohol more or less directly figured. The civil registration of births, deaths and marriages had been begun in England and Wales in 1837, with the establishment of the Registrar-General's office, and almost from the first the mortality records of that office had included deaths charged to "alcoholism, intoxication, dipsomania, drunkenness, ebriositas or inebriety." But, of course, the deaths so recorded were merely those primarily due to alcohol, and no attempt to trace the mortality indirectly due to alcohol seems to have been made until Mr. Neison entered the lists.

That gentleman restricted his investigation to an inquiry "On the Rate of Mortality Among Persons of Intemperate Habits," and presented his conclusions on that subject in an elaborate paper read before the Statistical Society of London, June 16, 1851, a copy of which is now before me. (Vol. 14, pp. 200-219, Journal of the Statistical Society, of London.) Although the author does not therein state the date on which his inquiry had been begun, its broad scope and the mass of tabulations would seem conclusively to indicate that the investigation must have taken at least a year or so, and the con-

ditions with which Mr. Neison's paper deals obviously were those of not later than 1850, or more than sixty years ago. The introductory paragraphs of the paper in question not only indirectly attest the lack of any specific data on the subject up to that time, but make clear the precise lines of the inquiry—and the difficulties attending it—and may therefore be regarded as worthy of reproduction at this point. In part the introduction to Mr. Neison's paper reads as follows:

In the present contribution, it is proposed to investigate the rate of mortality which prevails among persons addicted to the immoderate use of intoxicating drinks. Assurance companies have generally declined to assure such lives, from the supposed greater mortality to which they were believed to be subject; but no attempt has been previously made to test this opinion by properly-authenticated facts; and it is therefore hoped that the data now brought under consideration may not be without interest. The results are calculated to throw considerable light on a question not only curious in itself, but evidently of much importance to life offices, as well as to the public generally.

It may be well to remark, that, in collecting the present data, the intention was to include in the observations only such persons as were decidedly addicted to drinking habits, and it was not intended to bring within observation mere occasional drinkers, or what is usually termed generous or "free liver." The reasons for this distinction will hereafter appear. It may also be stated, that the primary reason for collecting the facts was to apply the results to life assurance operations, and it was consequently important to include only well-marked cases of intemperance. Examination will show that, for social and moral purposes, this would also have been the only satisfactory course to have followed; but, that the plan adopted for obtaining the present collection of facts may be the better understood, the following circular and schedule are given:

"MEDICAL, INVALID, AND GENERAL LIFE OFFICE,
25, Pall Mall, London.

"SIR:

"I beg to inclose you forms for the collection of cases of the mortality of persons of intemperate habits.

"Many difficulties have been experienced in our attempts to procure satisfactory data on the value of life among persons addicted to the excessive use of intoxicating drinks, and therefore the present method has been resorted to, in order to increase our information on the subject. May I beg to solicit your assistance in filling up any portion of the inclosed schedules; and should your knowledge of cases be so extensive as to require more than the number sent, others will be forwarded on hearing from you to that effect. If you could also suggest any gentleman who would be useful to us in giving the information required, I would put myself in communication with him on the subject.

"Hoping I may calculate on your co-operation, I beg to direct your attention to the subjoined hints on filling up the schedules.

I am, sir,

Your most obedient servant,

F. G. P. NEISON, *Actuary.*

"N.B.—No case should be entered in the schedule unless the person alluded to was decidedly addicted to drinking habits during a considerable period of life.

"The peculiar feature of the intemperance, whether the favorite beverage was fermented or distilled liquors, should be stated in the column 'Remarks,' and also whether the intemperance continued to the time of death.

"If the correct age at death be known, it will be entered as such; if not, the age must be guessed or approximated to by whoever fills up the schedule, or by the *mean age* of that guessed at by two or three persons who may have known the individual in question.

"The name in full, or at least the initials of the person in question, and also the place of death, should be entered in the columns set apart for that purpose. This will be necessary, in order to correct double entries which may be made by two different persons.

"In the column of the 'Cause of Death,' insert the post-mortem examination, if practicable, such as diseases of the heart, liver, lungs, kidneys, etc. (*and perhaps terminating in dropsy, etc., etc.*).

"Please to return the schedules as soon as you have entered all the cases which have come under your observation.

"It is not expected that the schedules can be always filled from registers or notes kept for the purpose; but generally from a distinct recollection of the cases; and an approximation to the truth is therefore all that is calculated on being obtained.

INTEMPERANCE—SCHEDULE

Description			Death			Disease or Cause of Death.	Duration of Intemperance.	Remarks on the Peculiar Features of Intemperate Habits; whether they existed up to the Period of Death, and any other Observations necessary.
Name or other Distinction.	Sex	Profession or Occupation.	Date of	Place of	Age at			

"It is obvious that it would be very difficult, if not impossible, to give a definition of what constitutes intemperate habits that would be satisfactory to every one; almost every person would have a standard of his own by which to determine the fact of temperance or intemperance, and

therefore in the preceding circular no attempt has been made to define the particular character of habits on which information is sought; all that has been urged on the attention of those filling up the schedules is to give only well-marked cases, and to include only persons who were decidedly addicted to drinking habits. The consequence of following this course is, that the objections which might be urged against the adoption of any individual or peculiar test are avoided, for, by leaving it to each contributor of data to determine for himself what constitutes decidedly intemperate habits, the whole data taken collectively, from all the various contributors, will show very precisely the result of those habits which the public, by common consent, admit to be intemperate; so that, however any individual reasoner on the results may argue, and whatever peculiar construction he may choose to put upon them, it will be impossible to avoid the conclusion, that the data really relate to what the public generally regard as persons of intemperate habits."

The methods and limitations of Mr. Neison's investigation having thus been outlined in some detail, the general results of his inquiry may be summarized in the reproduction of three of his many tabulations, which were as follows:

Abstract A

Ages	Number Exposed to Risk	Died	Mortality per cent.	Number Exposed to Risk	Died	Mortality per cent.	England and Wales. Mortality per cent.	Proportion of Intemperance Mortality to that of England and Wales	Number which ought to have died according to England and Wales
16-20	74.5	1	1.342	74.5	1	1.342	.730	1.8	.5
21-25	352.5	16	4.539	949.0	47	4.953	.974	5.1	9.2
26-30	596.5	31	5.197						
31-35	877.5	32	3.647	1,861.0	86	4.620	1.110	4.2	20.7
36-40	983.5	54	5.491						
41-45	897.5	51	5.682	1,635.5	98	5.992	1.452	4.1	23.7
46-50	738.0	47	6.369						
51-55	539.0	27	5.009	966.0	62	6.418	2.254	2.9	21.8
56-60	427.0	35	8.197						
61-65	300.5	16	5.324	500.5	40	7.992	4.259	1.9	21.3
66-70	200.0	24	12.000						
71-75	87.0	18	20.690	110.0	20	18.182	9.097	2.0	10.0
76-80	23.0	2	8.696						
81-85	10.0	2	20.000	15.0	3	20.000	19.904	1.0	3.0
86-90	5.0	1	20.000						
Total	6,111.5	357	5.841		357				110.2

Abstract B

Immediate Cause of Death	Number of Deaths at the following Ages :																
	16	21	26	31	36	41	46	51	56	61	66	71	76	81	86	Total	
	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to		
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		
Head Diseases	2	10	13	23	15	13	6	7	1	2	4	1	...	97			
Respiratory	1	6	12	7	11	11	10	8	5	4	5	...	1	1	82		
Liver Disease and Dropsy...	4	3	6	6	8	13	8	11	6	10	7	1	...	83			
Gout, Rheumatism and Heart	...	1	2	4	2	...	2	...	1	...	1	1	1	...	11		
Urinary Organs .....	...	2	...	1	...	...	2	1	...	1	3	...	...	...	6	
Bowel Disease .....	...	1	1	2	2	3	...	2	2	...	...	...	...	...	7	
Fevers .....	...	1	1	2	2	3	...	2	2	...	...	...	...	...	13	
Cholera and Diarrhoea.....	...	1	1	1	1	1	...	1	...	1	...	...	...	...	4	
Suicide	2	1	1	2	2	1	...	...	...	...	...	...	...	...	9	
Other Diseases	1	2	2	6	7	5	4	8	...	4	6	...	...	...	45	
	1	16	31	32	54	51	47	27	35	16	24	18	2	2	1	357	
Total.....	~	~	~	~	~	~	~	~	~	~	~	~	~	~			
	47	86	98	62	40	20	3										
Delirium Tremens, included in Head Diseases.....	2	7	10	16	10	5	3	2	...	2	...	...	...	...	57	
Intemperance .....	...	...	...	...	3	2	1	2	...	...	...	...	...	...	8	
	~	~	~	~	~	~	~	~	~	~	~	~	~	~			
	9	26	20	8						2					65		
Or one in.....	5.22	3.31	4.90	7.75	.....	10.00	.....									

Abstract C

Ratio per cent. of Deaths, at Ages 20 and upwards, from Different Causes, to the Total Deaths, from all Causes, at the Corresponding Ages, in

Cause of Death.....	England and Wales, 1847	Gotha Life Office	Scottish Widows' Fund	Intemperate Lives
Head Diseases	9.710	15.176	20.720	27.10
Digestive Organs ..	6.240	8.377	11.994	23.30
Respiratory Organs.	33.150	27.843	23.676	22.98
Total of the above three classes	49.100	51.396	56.390	73.38

As will be recalled, at the very outset of his inquiry Mr. Neison very properly emphasized the fact that his intention was "to include in the observations *only such persons as were decidedly addicted to drinking habits,*" and consequently the tabular results of his investigation which I have reproduced

presumably deal only with immoderate drinkers. In other words, the figures in question do not purport to contrast, directly or indirectly, the mortality of either temperate drinkers or non-abstainers in general with total abstainers or the community at large, but are restricted to immoderate drinkers. Giving due weight to that particular adverse selection, the fact that the mortality of the lives under observation was more than three times as high as the normal mortality of the population of similar ages in England and Wales at that time—357 deaths having occurred among the 6,111.5 drinkers as against the 110.2 which might have been expected at the normal rate—is by no means surprising. In Abstract B, it is recorded that 57, or practically one-sixth of the total of 357 deaths, were directly due to delirium tremens, and that single feature of the tabulations would seem to demonstrate in most convincing fashion the pronouncedly-abnormal class of lives which figured in the investigation.

Exceedingly painstaking and creditable though Mr. Neison's pioneer work on these lines was, it affords no clues as to either (1) the mortality of non-abstainers in general as contrasted with that of total abstainers, or (2) the presumable ratio of those two classes in the population of England and Wales in the period of which it treats. It does shed considerable light on the death-rates at the various ages which might have been expected among immoderate drinkers at that time, and at least strongly suggests the probable lines of that mortality, but there its utility as a means of measuring the mortality presumably due, directly or indirectly, to alcohol practically ends. A comparison of these first findings in the interesting field of inquiry in question with the results of a similar investigation sixty years later would make a valuable contribution to the literature of alcoholism, but would be possible only were the twentieth-century inquiry to be conducted in the same field and on substantially-identical lines. And even in that event, the results of the comparison might be utterly misleading owing to the probable decided change in the general interpretation of the phrase "persons of intemperate habits" in 1911 as compared with that in, or prior to, 1850.

Possibly one more of Mr. Neison's conclusions may deserve at least casual mention as a pioneer contribution to one

phase of the subject of the mortality of alcoholism, namely the apparent relative effects of fermented and distilled beverages. It of course should be borne in mind, once more, that his investigation was restricted to "immoderate drinkers," and taking that fact into account his findings on this phase of the subject were as follows:

"The facts collected in the preceding Schedule required an enumeration of the peculiar feature of the intemperance in respect to the favorite beverage, and it is curious to remark the influence of the different kinds of drink on the duration of life.

"The duration of life, after the commencement of the intemperate habits, is,

Among beer drinkers.....21.7 years.

Among spirit drinkers.....16.7 "

And among those who drink both spirits

and beer indiscriminately.....16.1 "

and, consequently, the rate of mortality will be,

Among beer drinkers.....4.597 per cent. yearly.

Among spirit drinkers.....5.996 " " "

Among mixed drinkers.....6.194 " " "

"Intemperate indulgence in the use of distilled liquors is hence more hurtful to health than the like use of fermented liquors, but the immoderate use of both combined is more injurious than the exclusive use of the one kind only."

CHAPTER II

THE SECOND ENGLISH INVESTIGATION, BY THE HARVEIAN SOCIETY IN 1879-1882

THE second important investigation of alcoholic mortality made under English auspices was conducted by the Harveian Society, of London, which in the early part of 1879 appointed a committee to investigate the extent of mortality referable to alcohol, and its proportion to the mortality from all causes; the proportion in which it is distributed between the two sexes; the ages at which, and the occupations in which, it chiefly occurs; and the modes of death. The inquiry was restricted to London, inquiry blanks were sent to all general practitioners in that city, and the Committee's report of the results of its inquiry was read before the Society, November 16, 1882, and was published in "The British Medical Journal's" issue of January 20, 1883 (Volume 1 for 1883; pp. 97 *et seq.*). In the inquiry blanks physicians contributing data were requested to classify all deaths (both male and female) reported by them in one or other of these three groups:

- A—Deaths in no wise due to alcohol;
- B—Deaths accelerated or partly caused by its abuse;
- C—Deaths wholly due to it;

and a total of 10,000 deaths was reported on these lines, 7,505 being returned by private practitioners, 1,172 by workhouse infirmaries and lunatic asylums, 646 by hospitals, and 677 by way of inquest reports. The 10,000 deaths thus reported were classified in the Committee's report as follows:

A—Deaths in no wise due to alcohol.....	8,598;
B—Deaths accelerated or partly caused by its abuse	1,005;
C—Deaths wholly due to it.....	397;
and in its analysis of these figures the Committee called attention to the fact that there were "as nearly as possible 14 per cent. in the causation of which alcohol appears to have played some part. If this part were, in all cases, a leading one, it	

would correspond to an annual adult mortality of about 5,870 in London, or 38,971 in England and Wales, assuming for the moment that the metropolitan figures would apply to the whole country." Its tabular summaries of deaths by classes, ages and causes, in the case of those in which alcohol presumably played at least some part, were thus presented:

Table II

	20-29	30-39	40-49	50-59	60-69	70-79	80-	Total
Class B.								
Male	44	111	170	165	119	48	4	661
Female	15	66	68	86	75	28	6	344
Total	59	177	238	251	194	76	10	1,005
Class C.								
Male	19	52	74	50	40	7	..	242
Female	6	35	42	47	19	4	2	155
Total	25	87	116	97	59	11	2	397

Table III

Causes of Death	All Ages over 20 in London in 1878		Class B		Class C		Classes B and C	
	Total	Per Ct.	Total	Per Ct.	Total	Per Ct.	Total	Per Ct.
All Causes	41,929	....	1,005	....	397	....	1,402	....
Pneumonia and Pleurisy	1,717	3.8	70	7.0	11	2.8	81	5.7
Bronchitis, Asthma, Emphysema and Congestion of Lungs.....	6,498	15.5	107	10.0	11	2.74	118	8.4
Phthisis	7,966	19.2	162	16.1	22	5.54	184	13.1
Heart Disease	4,517	10.77	76	7.56	13	3.3	89	6.35
Chylopoietic Viscera (diseases of)	1,715	4.0	164	16.0	150	38.0	314	22.4
Nervous Diseases	5,186	12.36	154	15.32	85	21.4	239	17.0
Kidney Diseases, Albinuria, Uremia ..	1,351	3.22	75	7.45	20	5.0	95	6.77

The final conclusions of the Committee were, in part, thus summarized in its report: "We find, therefore, upon the whole, reason to think that, in the metropolis, the mortality among any considerable group of intemperate persons will differ from that generally prevailing among adults in the following important particulars, viz., a fourfold increase in the deaths from diseases of the liver and chylopoietic viscera; a twofold increase in the deaths from disease of the kidney, a

decrease of half as much again in those from heart disease, a marked increase in those from pneumonia and pleurisy, a considerable increase and an earlier occurrence of those from disease of the central nervous system; a marked decrease in those from bronchitis, asthma, emphysema, and congestion of lungs, a decrease nearly as great in those from phthisis, and a later occurrence, or at least termination, of the disease; a very large decrease in those from old age, with an increase in those referred to atrophy, debility, etc., and the addition of a considerable group referred in general terms to alcoholism or chronic alcoholism, or resulting from accidents."

The Harveian Society's investigation notably differed from that conducted by Mr. Neison thirty years before, not only in the breadth of its field of inquiry but in the general application of its deductions and inferences. Both investigations had included the consideration of female as well as male deaths in which alcohol had presumably played some part, but from that common starting point practically diverged, Mr. Neison's inquiry having considered only "persons of intemperate habits," whereas the Harveian Society's inquiry attained a much broader sweep by eliminating any narrow restrictions of the kind, and calling for reports on all deaths on which the contributors of data were competent to report. As I have previously noted, the Neison investigation shed no light, direct or indirect, on either the total number or percentage of deaths presumably in some measure due to alcohol, but, taking the experience of London as a basis, the later investigation at least suggested a hypothetical approximation of the total number of deaths of both sexes in both London and England and Wales due to alcohol, and the ratio of these deaths to the total mortality of the fields of observation in question. Its scope was, therefore, decidedly broader.

CHAPTER III

THE BRITISH MEDICAL ASSOCIATION COMMITTEE'S INQUIRY IN 1885-1886

THE third of the English investigations of alcoholic mortality was begun about six years after that of the Harveian Society, and was conducted by the Collective Investigation Committee of the British Medical Association. The findings of this Committee were presented under the title of "Report on the Inquiry into the Connection of Disease with Habits of Intemperance," which was prepared by Isambard Owen, M.D., M.A., F.R.C.P., secretary to the Committee, and was published in "The British Medical Journal" of June 23, 1888. The scope and plan of the inquiry are thus outlined in the introductory paragraphs of the report:

The inquiry of the Collective Investigation Committee into the above subject was carried on from May 9, 1885, to December 11, 1886.

The form of inquiry-paper was suggested by Dr. Edward Casey, of Windsor, who has taken a part in preparing the Report. It consisted essentially of a table containing seven columns. The table was divided horizontally into twenty-five spaces, and each space was distinguished by a numeral placed in the first column. The second, third, and fourth columns were headed "Occupation or Social Position," "Age at Death," and "Cause of Death."

The contributor to the inquiry was requested to take his death certificate book for the last three years, and to fill in columns 2, 3 and 4 from the counterfoils of his certificates of males over 25 years of age, in order as they came.

In column 5 he was requested to append a mark signifying whether the deceased has ever suffered from gout or not, whenever such information was available.

In the 6th column he was requested to indicate the alcoholic habit of the deceased by an index-letter A, B, C, D or E, corresponding with the following scale of alcoholic classes:

- Class A—Total Abstainers,
- Class B—The Habitually Temperate,
- Class C—The Careless Drinkers,
- Class D—The Free Drinkers,
- Class E—The Decidedly Intemperate.

If a doubt exist to which of two classes a patient should be consid-

ered as belonging, he may be placed between the two by joining the letters, as AB or CD.

The inquiry was placed in the hands of all members of the Association, and 178, whose names are printed in an appendix, (A) responded to it, forwarding 250 schedules of returns, including altogether 4,234 cases in which the alcoholic class was named, without counting those in which a blank was left.

The Committee's tabular summary of the results of its investigation was as follows, not including the restatement of the definitions of the several classes which I have interpolated:

Table I—Table Showing the Number of Cases Falling in Each Class and the Percentage of Each Class on the Aggregate of Cases.

Class	No. of Class	Percentage
A—(Total Abstainers)	122 or	2.8 p.c. of 4234
AB—(Either Class A or Class B)....	54 or	1.2 " "
B—(The Habitually Temperate)....	1,529 or	36.1 " "
BC—(Either Class B or Class C)....	178 or	4.2 " "
C—(The Careless Drinkers).....	977 or	23.0 " "
CD—(Either Class C or Class D)....	112 or	2.6 " "
D—(The Free Drinkers).....	547 or	12.9 " "
DE—(Either Class D or Class E)...	100 or	2.3 " "
E—(The Decidedly Intemperate)...	603 or	14.2 " "
Unclassified	12 or	0.2 " "
Total.....	4,234	

Many other tabulations were included in the report of the Collective Investigation Committee, but unfortunately none of them contributes additional light on the important question as to how many, and what percentage, of the 4,234 deaths reported were presumably due to alcohol. The above table perhaps indirectly sheds a ray or so of light on that question, by showing that 55% of the total number of deaths listed were those of adult males classified as careless drinkers, free drinkers, or decidedly intemperate (in Classes C to E), but it scarcely could be believed that any such percentage of the total of adult male deaths in Great Britain could properly be thus classified. Hence, interesting as the report and figures of the Committee are, they do not materially add to the data presented by the previous report of the Harveian Society's investigation—in truth are not of as broad significance as were those of that investigation of the early '80's.

Any significant comparison of the results of the three English investigations whose figures have been presented would be practically impossible, owing to the dissimilarity of their several fields of inquiry. And the only specific suggestion of the probable mortality of England and Wales in which the use of alcohol directly or indirectly figured is that advanced by the Harveian Society, namely, that should its sampling figures for London hold good for the whole country alcohol might be assumed to have played some part in about 14 per cent. of all deaths at adult ages. To be sure, this conclusion was based on but 10,000 of the half-million deaths at all ages which were annually occurring in England and Wales thirty years ago, when the inquiry was conducted; about one-quarter of the 10,000 deaths were reported from workhouse infirmaries, lunatic asylums, hospitals and inquests; and all of the 10,000 were London deaths. For these reasons, there would seem to be room for serious question as the applicability to the whole country of the alcoholic death-rate thus computed on perhaps exceptionally-forbidding metropolitan data. But, in any event, the hypothetical percentage figure in question had this distinct advantage of the figures of either of the other English investigations, to wit, it was specific. And, furthermore, there was a particularly clean-cut definition of the class of deaths which was supposed to amount to 14 per cent. of the total adult mortality, Classes B and C including only "deaths accelerated or partly caused by its abuse (alcohol)" and "deaths wholly due to it."

CHAPTER IV

WIDE DIVERGENCE IN THE ESTIMATES OF MEDICAL COMMENTATORS

IN the case of practically all other approximations of the number, or percentage, of deaths due to alcohol which I have come across in my study of the literature of the subject there is, on the other hand, either a lack of specific definition of the assumed meaning of the phrase "deaths due to alcohol" or a more or less vague statement of that all-important premise. Not only is the premise almost-invariably loosely drawn, but there is the widest variance between the approximate estimates of medical men of the highest standing who have paid particular attention to the subject.

For instance, in his well-known work, "Alcoholism—A Study in Heredity" (published in 1902), Mr. G. Archdall Reid says (pp. 69-71) :

Dr. Ridge (Dr. James Ridge, in his "Alcohol and Public Health") quotes also various attempts made by medical men to estimate the mortality due to alcohol in the United Kingdom. Some of them place the annual death-rate as low as 52,640, others as high as 120,000. But into all of these medical estimates there enters one great source of error. They are founded on returns furnished by practicing doctors. But if a medical man does not *know* that a death has been accelerated by alcohol, he must place it in the opposite category; and very frequently, when a death has been so accelerated, he cannot know.

It is probable, therefore, that the highest estimates, based on medical returns, fall short of the actual truth. But even if only 120,000 deaths result, annually, directly or indirectly, from the use of alcohol, this would represent about one-sixth of the total mortality from all causes—a greater proportion than results from any single disease. It is, therefore, abundantly manifest that if alcohol, this great agent of elimination, be selective in its action, it must be a most potent cause of evolution.

In other words, Mr. Reid practically asserts that the adult deaths directly or indirectly due to alcohol in the United Kingdom amount to more than 16 per cent. of the total mortality of the Kingdom, but rests that assertion on only the broadest, and most sweeping, generalizations and assump-

tions. On the other hand, Dr. Arthur Newsholme, one of the foremost statistical authorities of Great Britain, approaches in much more cautious fashion the subject of the mortality due to alcohol. In his contribution to the composite work of fourteen medical authorities on "The Drink Problem in Its Medico-Sociological Aspects," edited by T. N. Kelynack, M.D., M.R.C.P., and published in 1907, Dr. Newsholme says (p. 132) :

"So far it can be stated with a high degree of probability that over 6,000 deaths of men are annually caused in England and Wales by diseases induced by alcoholic indulgence. For every 100 such deaths among men, there are, according to the English experience, 81 among women. It is evident, therefore, that nearly 11,000 deaths were probably caused in England and Wales in 1904 by the two conditions which can with certainty be ascribed to alcohol. This means that about 5 per cent. of the total deaths in adults are caused by alcohol. This percentage probably very greatly understates the real facts."

While it could not be said that Dr. Newsholme flatly dissents from Mr. Reid's estimate of alcoholic mortality as 16 per cent. of the *total mortality*, he suggests 5 per cent. of *adult mortality* as a minimum, and leaves the subject broadly open with the remark: "This percentage probably greatly understates the real facts." The wide divergence of the hypothetical figures of medical commentators on alcoholic mortality is strikingly illustrated, however, by Mr. Reid's statement that "some of them place the annual death-rate as low as 52,640, others as high as 120,000," and Dr. Newsholme's remark that "nearly 11,000 deaths were probably caused in England and Wales in 1904 by the two conditions which can with certainty be ascribed to alcohol."

In practically all countries' vital statistics, deaths returned as due to Delirium Tremens, or Alcoholism, have been separately entered for many years, but probably a more deliberate attempt to classify deaths directly or indirectly due to alcohol has been made by governmental authorities in Switzerland than in any other country. In his contribution to "The Drink Problem in Its Medico-Sociological Aspects," above referred

to, Dr. Newsholme thus summarizes the results in recent years of this classification of deaths in Switzerland (p. 129):

"In the fifteen great towns of Switzerland, the percentage of total deaths from all causes among men of twenty years of age and upwards ascribed to alcoholism, or having alcoholism as an auxiliary cause, was 10.4 in 1902, 10.6 in 1901, 10.0 in 1900, 10.4 in 1899 and 10.5 in 1898."

To recapitulate, the more important estimates of the last thirty years, in the way of specific hypothetical figures for the percentage of total deaths directly or indirectly due to alcohol, range from Dr. Newsholme's minimum figure of 5 per cent. for adult deaths "which can with certainty be ascribed to alcohol," to Mr. Reid's extraordinary figure of more than 16 per cent. of the total mortality for both sexes at all ages, the Harveian Society's estimate of 14 per cent. of adult mortality and the 10 per cent. figure of the returns for adult male mortality in Switzerland coming in between those extremes. The Harveian Society's estimate that 14 per cent. of adult mortality in 1881-2 was directly or indirectly due to alcohol rests on the returns for 10,000 adult deaths in London; the Swiss assumption of about 10 per cent. of adult male mortality is computed on the basis of returns for "the fifteen great towns of Switzerland." And an examination of the figures for the mortality and distribution of population of Switzerland in the early years of the present century reveals the fact that as only about one-third of the population of that country was urban in character and the total mortality of the country about 60,000, presumably the total male deaths at all ages in the towns of Switzerland could not have exceeded approximately 10,000. The male deaths at adult ages in those towns therefore could not have numbered more than 6,000 or 7,000, and hence it is obvious that both the Harveian Society's estimate and the Swiss computation of the percentage of adult mortality presumably due to alcohol have these two shortcomings in common: first, that they are based solely on urban mortality, and involve no consideration of rural mortality which is invariably much lower than city mortality; and secondly, that both rest upon comparatively small mortality returns, in neither case exceeding 10,000 adult deaths.

Even had the conditions in the Registration Area of the United States in 1908 been identical with those of London in 1881 and those of the Swiss towns in the early years of the present century, in so far as the relations of alcohol and mortality were concerned, there would be a considerable difference between the United States' percentage of deaths in which alcohol figures as a factor and those of London and the towns of Switzerland, a large rural population being considered in the case of this country's mortality and not in the two other instances. Furthermore, the detailed computations for the Registration Area of the United States accompanying this paper deal with mortality running into the hundreds of thousands, instead of with 10,000 or less deaths, so that a pronounced variation in the ratio of alcoholic mortality to the total adult mortality might confidently be expected. Making due allowance for these facts, the interesting question naturally arises: how does the hypothetical percentage of the mortality of this country due to alcohol compare with the European percentage assumptions, and are the differences of such a nature as to accord with the available data bearing upon them?

CHAPTER V

THE METHODS BY WHICH THIS INVESTIGATION HAS BEEN MADE

IN order that the methods employed in arriving at the approximation of mortality due to alcohol in the United States may be clearly understood, it may be desirable to retrace in detail at this point the outline of the modus operandi of the investigation as briefly sketched on the opening pages of this paper.

It having been decided, after consultation with various medical authorities on the subject, that not only the most solidly-butressed approximation of the mortality due to alcohol might be deduced, but that perhaps considerable new light might be turned on the many-sided subject, by the consideration of the probable *percentage* of male deaths directly or indirectly due to alcohol in the case of each cause of death in which alcohol could possibly have been a causative or contributory factor, obviously the first requisite in laying out the plan of the investigation was the determination of a complete list of causes of death with which alcohol could in any way be associated. To that end a copy of the Ninth Annual Report of the Bureau of the Census, containing the Mortality Statistics of the Registration Area of the United States for the year 1908, was placed in the hands of one of the best-qualified insurance medical-directors in New York City, and the physician in question requested to check every one of the 187 causes and classes of causes of death therein listed in the case of which, in his judgment, any male deaths between the ages of 20 and 74, inclusive, could possibly have been due in whole or part to alcohol.

One of the fundamental purposes of the proposed investigation being to reduce it to the exactness of a consideration of individual causes of death, and thereby in so far as possible eliminate the possibility of wide margins of error attendant

upon broad generalizations of large numbers, it was apparent at the very outset that all "classes of causes" of deaths—such, for instance, as "general diseases," "diseases of the nervous system," "diseases of the circulatory system," etc.—must be discarded from the list. So, too, must be all causes of death restricted to women and children, and by this process of elimination 54 of the 187 classifications of causes of death—or separate numberings for sexes—were thrown out as foreign to the investigation. Of the 133 remaining causes of death, no less than 106, or about eighty per cent., were checked by the physician as those which in his opinion might properly come within the scope of the inquiry. That the list thus made up was unquestionably complete, and omitted no causes of death which should have been included, will probably be shown to the satisfaction of the most critical student of the appended tabulations by the fact that in the case of 31 of these 106 causes of death one or other of the three physicians whose percentage estimates for each cause are therein presented has apparently considered the possible alcoholic connection so extremely remote as to justify him in declining to make any estimate, however small, of male deaths between 20 and 74 years of age from those causes in which alcohol might possibly have played a part.

As has already been stated, the list of causes of death thus carefully made up had been restricted to causes of male deaths between 20 and 74, inclusive, in which alcohol might have been a causative or contributory factor. The exclusion of female deaths from consideration in shaping the list was not due to, or intended to imply, any question of the fact that undoubtedly several thousands of female deaths in the United States each year are directly or indirectly due to alcohol. There is no room for argument on that score; the unfortunate fact is too well known to all students of the subject to admit of argument. But, in the judgment of the authorities on the subject with whom I consulted before deciding upon the lines on which the investigation should be mapped out, the inclusion of female deaths in the estimation of the percentages of adult deaths from the various causes in which alcohol might have figured would introduce an exceedingly uncertain and trying element in the calculation for many of the causes of

death, and the attempt to strike an average for both male and female deaths in the case of at least some diseases would very probably detract, and seriously detract, from the accuracy of these estimates. As these physicians looked at it, a much wiser course would be to consider only male deaths in computing the probable percentage of adult deaths directly or indirectly due to alcohol in the case of each cause of death, and then make a rough general estimate of the presumable percentage of female deaths between these ages and from these causes due to alcohol in the light of the final showings of the detailed computation of male deaths.

The reason for restricting the percentage to male deaths being thus explained, a word or so of explanation as to the reasons for restricting it to male deaths between the ages 20 and 74, inclusive, should suffice, so self-evident are the causes for those limitations. Undoubtedly now and then a mere strippling, between 15 and 20 years of age, does prematurely die as a result, in whole or part, of his excessive use of alcohol; and quite a number of infant deaths are doubtless due to alcoholic indulgence on the part of one or both of the parents. But, in the case of the great majority of causes of death the percentage of male deaths under 20 years of age would be so small as practically to be a negligible quantity, and in consequence of the extremely limited experience with deaths on those lines any percentage estimates would be little more than the wildest guesswork. It therefore seemed undesirable to include in the investigation male deaths under that age. In the case of male deaths at or over 75 years of age—that is to say, well past the allotted age of three score years and ten—the percentage due to alcohol is probably too small to be worthy of serious consideration in a statistical study of alcoholic mortality. That there now and then are deaths at those advanced ages in which alcohol figured as a causative or contributory factor, there can be no question. But, as one eminent physician with whom I discussed the matter put it: "If a man who has habitually used alcohol to any appreciable extent nevertheless has survived to age 75, he can practically be regarded as alcohol-proof. As a general proposition, the man who has reached the seventies is not very apt to contract any pronouncedly new habits at that age, and I think you can safely leave out of your

count the very few male deaths at 75, or older ages, in which alcohol is really a factor of any importance."

The preliminary outline of the proposed investigation having thus been determined, lists of the 106 causes of death in question were made out, and in accordance with a consensus of expert medical opinion divided into three groups, the lines of demarcation being as follows:

Group A—Causes of death in which alcohol may have been an important contributory factor, and sometimes the principal causative factor, in the case of male deaths between ages 20 and 74, inclusive;

Group B—Causes of death in which alcohol may have been a minor contributory cause, or at least a distinctly disturbing factor, in the case of male deaths between ages 20 and 74, inclusive;

Group C—Causes of death in which alcohol was not primary or secondary cause, but may have been a harmful contributory factor, in the case of male deaths between ages 20 and 74, inclusive.

The first group of causes was made to include 28 causes of death, the second group 48, and the third group 30, and the diseases, or causes of death, included in each group are specified in the appended tabulations. In each case, the index number which the cause in question bears in Table 6 of the Mortality Statistics for 1908 (Ninth Annual Report of the Bureau of the Census, pages 474-481) is prefixed in the following tables, in order that the accuracy of the figures cited and the resultant computation in any particular case may be capable of ready verification.

CHAPTER VI

THE JURY OF MEDICAL EXPERTS ON WHOSE ESTIMATES THE VERDICT IS BASED

THE listing and grouping of the causes of death completed, the important question next in order was the selection of the expert jury to which the list should be submitted for co-operation in the way of estimates as to the percentage of male deaths between ages 20-74, inclusive, from each cause presumably in whole or part due to alcohol. Manifestly only physicians of broad experience, and only those who had given special thought to alcohol as a factor in male mortality, were eligible for this jury. It seemed to me that neither the general practitioner nor the medical specialist would have quite as sweeping qualifications for the work as would the medical directors of large insurance companies, for the reason that, in the first place, the work of the medical director of a large insurance company is laid out on a wholesale basis, so to speak, whereas that of the private practitioner is on retail lines, however extensive his practice. To be sure, the ordinary practitioner is brought in close personal touch with each of his cases, whereas the medical director of a large insurance company has practically no time for private practice, and very rarely is brought in contact with the man on whose application for insurance, or whose death-claim, he passes. Consequently the ordinary physician unquestionably has much more exact, specific, knowledge of the people who come to him as patients than does the medical director of the people on whose papers he passes. But, on the other hand, the medical director's field is much broader than that of the vast majority of physicians, he being habitually called upon to pass upon thousands of cases where the private practitioner handles dozens, it might almost be said. Then again, the use and abuse of alcohol, and its effect on the probable longevity of men of almost all kinds and classes, are questions which constantly confront the medical director and on which his information

must be strictly up to date if he is to be competent to pass upon the thousands of applications for insurance which annually come his way. Every application-blank for life, health, or accident insurance contains questions as to the drinking habits of the applicant, and the medical director is therefore habitually in contact with a reminder of the alcohol factor of mortality.

It has seemed to me, for these reasons, that the experienced medical director occupies a vantage-point from which he can perhaps get an even broader view of the probable relations of alcohol with the male mortality from the several causes than can even the general physician of extensive practice, although the latter undoubtedly does have the advantage of personal contact with his cases. Obviously, the medical specialist would be disqualified for passing upon the percentage of deaths due to alcohol in any field outside of his own professional bailiwick, and for diametrically different reasons the surgeons of wide experience in either high-grade private hospitals, or large public hospitals in which unfortunates of the lower order predominate, would probably be unable to make safe estimates of the all-around percentages of male deaths due to alcohol, owing to the fact that the former would most likely under-estimate and the latter almost certainly overestimate.

The Medical Directors whose aid was asked in arriving at fair average percentage estimates of the male deaths due to alcohol from the 106 causes of death included in the appended tabulations were men thoroughly representative of the medical directorates of the established life and accident insurance companies of this country, being Dr. Brandreth Symonds, Chief Medical Director of the Mutual Life Insurance Company of New York; Dr. Eugene L. Fisk, Medical Director of the Postal Life Insurance Company, and for many years Medical Director of the Provident Savings Life Assurance Society, which was recently absorbed by the Postal Life; and Dr. William L. Gahagan, Medical Director of the United States Casualty Company. All three of these physicians had more or less private and hospital practice prior to assuming their present positions, all of them have written and published various papers or books on medical subjects, and all of them have given especial attention to the relations of alcohol and mor-

tality. The recent experience of Drs. Symonds and Fisk of course has been with the bearing of alcohol upon the life insurance risk, and that of Dr. Gahagan with its bearing on health and accident risks.

To each of these physicians a list of the 106 causes of death, grouped in the three classes before named, was submitted and each of them was asked to put opposite the name of each cause of death his personal estimate of the percentage of male deaths from that cause between ages 20-74, inclusive, which presumably were directly or indirectly due to alcohol. None of the physicians in question had any information, or has had any information prior to the publication of this paper, as to the estimate in any case of either of the other physicians. And none of the three had any idea as to either the total number of male deaths presumably chargeable to alcohol, or the percentage of the total number of male deaths from these causes and at these ages, which his estimates of percentages for individual causes of death would show up. In a word, there was no consultation of any kind as to the estimates in any case, and conclusive proof of that fact is shown in the wide variations in the three physicians' estimates in the case of some causes of death.

These variations had confidently been expected—and in fact, hoped for—as expressive of the wide difference of expert medical opinion on the subject, and in consequence of these same wide variations of estimates the *average* of the three estimates in each case would therefore seem to be thoroughly representative of the medical opinion of the country at large. The results of a poll on similar lines of the estimates of, say, one hundred general practitioners of broad experience in various sections of the country, would be extremely interesting, but I gravely doubt if the *average* of those one hundred estimates in the case of each of the 106 causes of death would very materially differ from the *average* of the three widely-varying estimates presented in this paper. In any event, the averages herein presented, and the numbers of male deaths directly or indirectly due to alcohol computed on that basis, in the case of the 106 separate causes of death, at least offer a specific starting-point for expression of pro or con medical opinion. And, to that extent, I venture to hope, the publica-

tion of the results of this investigation on entirely new lines promises to take the much-mooted subject of the mortality due to alcohol out of the realm of mere speculation, and broad generalizations, and constitute a sound basis for thoughtful, scientific, discussion.

I have the word of such eminent authorities on the subject as Dr. John S. Billings and Mr. John Koren for the statement that up to date there has been no scientific investigation of the mortality due to alcohol in the United States. Dr. Billings, who was in charge of the Division of Vital Statistics of the Eleventh Census, and author of the famous Index Catalogue of the Library of the Surgeon-General's Office, U. S. Army, Washington, D. C., 1880-1891, was one of the foremost movers in the work of the Committee of Fifty to Investigate the Liquor Problem—whose notable work on those lines in 1893-1903 attracted international attention—and incidental to the work of that committee compiled an authoritative "Bibliography of Alcohol." Mr. Koren was also actively identified with the investigation conducted by that committee, and was the author of two of the six volumes published by it. The recent declaration of both of these authorities that they know of no scientific investigation of the mortality of alcohol in this country up to date may therefore be accepted as conclusive, and in view of this fact it seems especially fortunate that the results of this pioneer investigation of the subject in the United States should be published in the form of specific figures for each of 106 causes of death, thus making every detail of calculations open to the most critical analysis of experts, whatever their individual views or position on the subject of alcohol. As I have before remarked, the conclusions deduced from the appended tabulations are purely statistical, and entirely free from bias or prejudice of any kind, and are submitted as at once a tentative approximation, and a specific starting point for the thoughtful discussion, of the adult mortality of the United States properly chargeable to alcohol.

CHAPTER VII

THE TABULATED RESULTS OF THIS INVESTIGATION OF AMERICAN MORTALITY

As will at once be apparent from a casual inspection of the tables which follow, the average percentage for male deaths from each cause between ages 20-74, inclusive, has been obtained by the simple process of adding the individual estimates of the three physicians in each case, and dividing that total by three. The number of deaths from each cause presumably due to alcohol has then been obtained by multiplying the total number of male deaths from that cause, between the ages in question, in the Registration Area of the United States, as presented in the Mortality Statistics of the Bureau of the Census, by that average percentage. The figures for the total number of male deaths from each cause in each age-group have been repeatedly checked up with those given in the Mortality Statistics in question, and it is believed that, statistically speaking, all errors have been detected and rectified. In the light of this detailed explanation of (1) the methods followed and (2) the source of the individual figures on which the computations have been based, the several tabulations should speak for themselves, and follow on pages 32-38:

TABLE I—MALE DEATHS BETWEEN AGES 20 AND 74, INCLUDING THOSE OCCURRING IN 1908, IN THE CASE OF WHICH ALCOHOL MAY HAVE BEEN A CAUSE, SOMETIMES THE PRINCIPAL CAUSE.

Index Number in U. S. Mortality Statistics for 1908.	Causes of Death	Three Physicians' Estimates of the Percentage of Male Deaths from Each of These Causes, between Ages 20 and 74, inclusive, Directly or Indirectly Due to Alcohol.				Total Male Deaths at all Ages in Registration Area in 1908.
		Dr. X.	Dr. Y.	Dr. Z.	Average	
43	Alcoholism	100%	100%	100%	100%	2,084
70	Diseases of arteries	20	30	20	23	4,761
84	Pneumonia (lobar and unqualified)	10	30	25	22	24,893
98	Gastritis	20	25	50	32	1,982
107	Cirrhosis of liver.....	80	90	30	67	4,488
117	Acute nephritis	10	25	20	18	2,501
118	Bright's disease	30	40	20	30	22,222
119	Other diseases of kidneys.....	5	30	10	15	739
121	Diseases of bladder.....	..	10	5	5	1,237
161	Suicide	10	40	20	23	6,429
164	Heat and sunstroke.....	10	95	25	43	550
165	Cold and freezing.....	10	15	25	17	205
167	Drowning	10	25	5	13	4,262
168	Inhalation of poisonous gases.....	..	40	10	17	1,100
169	Other accidental poisonings.....	..	25	5	10	957
170	Accidental gunshot wounds.....	5	20	5	10	885
171	Injuries by machinery.....	5	15	2	7	876
172	Injuries in mines and quarries.....	5	15	5	8	1,915
173	Railroad accidents and injuries.....	5	10	5	7	5,724
174	Street car accidents.....	5	10	8	8	1,397
175	Injuries by vehicles and horses.....	5	10	9	8	1,675
176	Automobile accidents	5	15	9	10	310
177	Suffocation	5	10	5	7	467
178	Other accidental injuries.....	5	20	5	10	7,129
180	Homicide	10	25	5	13	2,329
184	"Dropsy"	30	30	20	27	390
185	"Heart failure"	5	30	10	15	984
186	Other ill-defined causes .....	..	10	3	4	5,091
Totals.....						107,586

SIVE IN THE REGISTRATION AREA OF THE UNITED STATES
BEEN AN IMPORTANT CONTRIBUTORY FACTOR, AND
PAL CAUSATIVE FACTOR.

Male Deaths between Ages 20 and 74, inclusive, in Registration Area of the United States in 1908.												Deaths Directly or Indirectly Due to Alcohol, according to Physicians' Estimates.	
20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	Total 20-74	Average of Estimates	Number of Deaths on this Basis.
38	137	247	321	327	307	250	156	107	79	56	2,025	100%	2,025
10	20	54	78	119	165	234	298	443	631	751	2,803	23	645
880	949	1,113	1,353	1,395	1,557	1,513	1,346	1,401	1,316	1,221	14,044	22	3,090
30	31	64	63	73	68	93	108	124	135	146	935	32	299
28	79	155	340	432	576	601	558	567	475	312	4,123	67	2,762
110	140	159	196	184	192	167	168	156	139	111	1,722	18	310
363	509	737	998	1,255	1,642	2,006	2,251	2,654	2,662	2,436	17,513	30	5,254
23	22	29	29	35	33	57	53	59	62	75	477	15	72
5	13	10	24	16	34	44	54	73	133	178	584	5	29
531	582	626	716	667	757	686	556	430	293	191	6,035	23	1,388
23	24	36	38	39	51	44	39	26	28	19	367	43	158
10	9	17	15	20	23	19	12	12	14	7	158	17	27
552	376	287	294	296	218	177	127	96	50	32	2,505	13	326
108	97	106	93	91	83	86	73	57	47	31	872	17	148
30	40	44	51	57	73	58	38	28	31	21	471	10	47
132	84	73	53	34	39	27	15	13	6	6	482	10	48
116	112	112	94	76	66	54	44	24	16	10	724	7	51
317	379	264	225	200	130	95	49	28	19	5	1,711	8	137
719	791	669	665	520	485	343	238	222	142	107	4,901	7	343
105	97	116	105	120	107	97	90	85	61	31	1,014	8	81
87	77	108	119	128	148	123	111	107	90	64	1,162	8	93
21	12	22	24	21	22	19	21	14	14	9	199	10	20
17	16	18	17	17	12	9	16	8	3	3	136	7	10
535	570	567	613	577	573	455	368	356	279	270	5,163	10	516
370	387	339	292	194	169	97	61	48	42	16	2,015	13	262
6	9	5	11	19	23	23	34	32	31	57	250	27	68
9	27	27	33	51	64	83	98	92	96	86	666	15	100
19	29	30	39	46	51	58	63	86	109	160	690	4	28
5,194	5,618	6,034	6,899	7,009	7,668	7,518	7,045	7,348	7,003	6,411	73,747	....	18,337

TABLE II—MALE DEATHS BETWEEN AGES 20 AND 74, INCLUDING 1908, IN THE CASE OF WHICH ALCOHOL MAY AT LEAST A DISTINCTLY

Index U.	Number of Mortality Statistics for 1908.	Causes of Death	Three Physicians' Estimates of the Percentage of Male Deaths from Each of These Causes, between Ages 20 and 74, inclusive, Directly or Indirectly Due to Alcohol.				Total Male Deaths at all Ages in Registration Area in 1908.
			Dr. X.	Dr. Y.	Dr. Z.	Average	
17	Dysentery	2%	15%	3%	7%		1,383
18	Erysipelas	2	5	2	3		1,065
20	Septicemia	2	10	4	5		917
21	Tuberculosis of lungs	2	25	8	12		38,055
22	Tuberculosis of larynx	2	25	5	11		463
23	Tuberculous meningitis	2	15	4	7		2,265
24	Abdominal tuberculosis	2	25	3	10		1,256
26	Tuberculous abscess	2	25	3	10		45
28	Tuberculosis of other organs	2	25	2	10		443
29	General tuberculosis	2	25	2	10		733
30	Scrofula	2	15	1	6		71
32	Cancer of mouth . . . . .	.	..	2	1		950
33	Cancer of stomach and liver . . . . .	.	..	5	2		6,537
34	Cancer of intestines . . . . .	.	..	4	1		1,649
37	Cancer of skin . . . . .	.	..	1	.3		827
38	Cancer of other or unspecified organs . . . . .	.	..	1	.3		3,083
40	Rheumatism	2	10	9	7		1,771
41	Diabetes	5	15	20	13		2,988
50	Meningitis	2	10	3	5		4,914
51	Locomotor ataxia	5	40	15	20		920
52	Other diseases of spinal cord	5	10	8	8		1,316
53	Apoplexy	10	30	25	22		16,527
54	Softening of brain	15	30	2	16		592
55	Paralysis	10	30	25	22		3,717
56	General paralysis of insane	20	40	1	20		1,772
57	Other forms of mental disease	20	25	10	18		836
58	Other diseases of brain	10	10	2	7		991
59	Epilepsy	20	20	3	14		1,023
62	Other diseases of nervous system	10	10	5	8		839
66	Pericarditis	2	10	2	5		310
67	Endocarditis	2	10	3	5		3,047
68	Heart disease	10	30	8	16		31,518
69	Angina pectoris	10	30	3	14		1,841
71	Embolism and thrombosis	2	20	2	8		848
72	Diseases of veins	2	20	15	12		111
73	Diseases of lymphatics	2	10	2	5		74
74	Other diseases of circulatory system	2	20	4	9		414
81	Acute bronchitis	2	15	15	11		3,656
82	Chronic bronchitis	2	25	10	12		2,266
85	Pleurisy	2	5	5	4		1,105
86	Congestion of lungs	2	20	10	11		1,296
87	Gangrene of lungs . . . . .	.	25	5	10		104
88	Asthma and emphysema	10	10	3	8		812
97	Ulcer of stomach	5	15	10	10		866
101	Diarrhea and enteritis	5	25	5	12		27,828
105	Acute yellow atrophy of liver . . . . .	.	10	10	7		68
106	Hydatid tumors of liver . . . . .	.	..	5	2		5
113	Other diseases of digestive system	2	20	4	9		127
Totals							174,244

SIVE, IN THE REGISTRATION AREA OF THE UNITED STATES HAVE BEEN A MINOR CONTRIBUTORY CAUSE, OR DISTURBING FACTOR.

Male Deaths between Ages 20 and 74, inclusive, in Registration Area of the United States in 1908.													Deaths Directly or Indirectly Due to Alcohol, according to Phylsicans' Estimates.
20—	25—	30—	35—	40—	45—	50—	55—	60—	65—	70—	Total	Average of Estimates	Number of Deaths on this Basis.
24	29	34	39	44	49	54	59	64	69	74	20-74		
16	18	29	19	38	45	55	47	73	91	76	507	7%	35
25	35	28	54	58	76	63	68	61	55	75	598	3	18
32	42	52	69	62	53	75	50	55	46	42	578	5	29
4,518	4,981	4,967	4,793	3,965	3,222	2,562	1,922	1,331	1,008	631	33,900	12	4,068
39	49	56	53	53	51	41	33	24	18	12	429	11	47
100	82	52	59	52	28	19	15	12	3	1	423	7	30
102	93	90	91	78	84	64	50	53	48	31	784	10	78
3	2	6	1	2	4	4	2	..	1	..	25	10	3
29	30	34	37	32	42	33	29	20	15	12	313	10	31
64	77	80	54	39	44	41	21	27	21	9	477	10	48
1	1	2	1	2	..	..	1	..	2	..	10	6	1
2	7	9	26	44	71	96	134	137	132	113	771	1	8
18	46	78	178	327	607	779	963	1,046	980	731	5,753	2	115
22	34	50	76	91	123	144	227	248	217	191	1,423	1	14
2	2	4	16	19	47	54	67	85	117	135	548	.3	2
62	78	81	116	168	246	305	349	391	390	301	2,487	.3	7
79	81	85	102	100	97	100	112	110	115	127	1,108	7	78
105	100	115	117	131	214	261	331	372	388	310	2,444	13	318
198	132	111	125	102	94	90	53	50	47	32	1,034	5	52
6	11	16	44	71	105	135	150	141	108	79	866	20	173
34	36	46	51	64	72	99	111	123	121	138	895	8	72
87	128	230	346	508	846	1,177	1,584	2,061	2,392	2,389	11,748	22	2,585
1	5	6	12	18	19	26	31	55	75	124	372	16	60
23	28	48	69	92	147	182	268	394	487	591	2,329	22	512
5	41	128	258	311	295	205	149	105	87	70	1,654	20	331
37	37	38	49	58	66	62	61	64	89	86	647	18	116
39	73	79	68	64	86	82	47	46	47	39	670	7	47
101	103	85	90	79	56	56	47	57	44	34	752	14	105
34	31	37	46	42	45	45	44	34	33	42	433	8	35
11	10	14	15	14	14	23	23	33	34	32	223	5	11
71	109	113	149	207	185	231	255	312	279	301	2,212	5	111
487	626	832	1,109	1,443	1,846	2,327	2,737	3,515	3,914	4,051	22,887	16	3,662
10	20	20	51	66	126	169	223	253	326	240	1,504	14	211
23	19	30	43	60	46	61	75	82	97	107	643	8	51
4	2	4	8	8	15	10	9	9	7	10	86	12	10
2	2	1	1	1	2	1	2	..	2	..	14	5	1
24	13	8	9	17	19	12	13	6	10	9	140	9	13
9	8	10	14	16	17	21	37	46	34	63	275	11	30
23	26	21	54	57	70	106	136	184	228	304	1,209	12	145
65	56	78	71	75	87	72	74	61	58	43	740	4	30
12	25	20	32	46	45	36	48	61	82	91	498	11	55
5	4	3	7	11	13	11	11	14	8	2	89	10	9
2	14	19	29	33	45	52	92	106	96	100	588	8	47
29	46	57	63	91	90	91	94	77	70	54	762	10	76
45	77	68	95	86	111	136	138	171	220	259	1,406	12	169
10	6	5	1	2	6	6	4	9	4	4	57	7	4
2	..	..	..	..	1	..	..	..	..	..	3	2	1
2	3	10	15	17	16	13	9	14	6	3	108	9	10
6,620	7,449	7,955	8,786	8,920	9,638	10,234	10,946	12,128	12,652	12,094	107,422	....	13,664

TABLE III—MALE DEATHS BETWEEN AGES 20 AND 74, INCLUDED IN 1908, IN THE CASE OF WHICH ALCOHOL WAS NOT BEEN A HARMFUL CON-

Index Number in U. S. Mortality Statistics for 1908.	Causes of Death	Three Physicians' Estimates of the Percentage of Male Deaths from Each of These Causes, be- tween Ages 20 and 74, inclusive, Directly or Indirectly Due to Alcohol.			Total Male Deaths at all Ages in Registration Area in 1908.	
		Dr. X.	Dr. Y.	Dr. Z.		
7	Typhoid fever	5%	5%	2%	4%	6,763
9	Smallpox	5	..	1	2	62
10	Measles	5	..	1	2	2,414
11	Scarlet fever	5	..	1	2	2,831
15	Influenza	5	10	3	6	4,518
19	Other epidemic diseases.....	5	10	1	5	89
27	White swelling	2	10	3	5	224
31	Venereal diseases	10	30	20	20	1,492
42	Anemia, leukemia .....	..	10	5	5	1,295
44	Chronic poisonings .....	..	..	10	3	208
49	Encephalitis .....	..	5	1	2	241
60	"Convulsions"	10	..	5	5	3,557
78	Laryngitis .....	..	15	5	7	211
79	Other diseases of larynx.....	..	5	2	2	263
89	Hemorrhage of lungs.....	5	25	1	10	412
102	Hernia .....	..	..	2	1	935
103	Obstruction of intestines.....	..	..	1	3	2,043
108	Biliary calculi	5	10	5	7	377
110	Diseases of spleen.....	..	5	3	3	54
111	Peritonitis .....	..	..	2	1	1,206
112	Appendicitis .....	..	5	2	2	3,140
120	Calculi of urinary tract.....	2	30	1	11	175
126	Other diseases of genito-urinary system.....	..	30	1	10	1,713
134	Gangrene .....	..	5	5	3	873
135	Carbuncle	2	10	5	6	135
136	Abscess	2	5	5	4	291
141	Diseases of bones.....	..	10	2	4	747
142	Diseases of joints.....	..	10	2	4	45
162	Fractures and dislocations.....	..	20	5	8	446
163	Burns and scalds.....	..	10	3	4	1,540
Totals.....					|| 38,300	

SIVE, IN THE REGISTRATION AREA OF THE UNITED STATES
 PRIMARY OR SECONDARY CAUSE BUT MAY HAVE
 TRIBUTORY FACTOR.

													Deaths Di- rectly or Indi- rectly Due to Alcohol, ac- cording to Physicians' Estimates.	
													Average of Estimates	Number of Deaths on this Basis.
20—	25—	30—	35—	40—	45—	50—	55—	60—	65—	70—	Total	20-74		
24	29	34	39	44	49	54	59	64	69	74				
1,150	1,021	751	606	422	323	261	171	114	83	54	4,956			
7	4	6	5	6	1	4	..	3	..	2	38	2	1	
27	6	11	7	10	3	3	1	1	2	2	73	2	1	
46	31	16	16	9	2	3	1	..	..	..	124	2	2	
83	89	91	129	161	184	199	227	312	351	477	2,303	6	138	
6	6	3	6	3	1	2	1	1	..	1	30	5	2	
27	22	6	10	18	10	10	7	12	9	6	137	5	7	
52	86	78	96	85	83	72	53	39	25	13	682	20	136	
45	60	53	69	80	100	116	101	113	106	71	914	5	46	
11	12	18	29	29	25	21	12	18	14	6	195	3	6	
7	4	10	10	5	12	8	6	6	7	6	81	2	2	
2	..	5	10	2	4	6	3	1	1	1	35	5	2	
5	6	5	2	2	3	3	6	5	4	1	42	7	3	
2	2	7	5	1	7	4	1	4	..	2	35	2	1	
24	28	32	46	47	40	39	32	29	25	10	352	10	35	
29	29	25	27	48	50	66	82	87	94	85	622	1	6	
76	71	83	74	69	99	103	128	118	129	126	1,076	.3	3	
4	5	16	16	21	36	49	54	29	47	53	330	7	23	
3	3	4	7	2	6	9	4	1	2	3	44	3	1	
66	81	68	61	69	62	70	59	61	65	50	712	1	7	
394	326	273	229	200	187	139	111	88	53	36	2,036	2	41	
3	4	8	3	13	10	14	17	15	20	21	128	11	14	
6	11	18	17	25	37	62	86	153	219	317	951	10	95	
4	8	11	7	16	30	25	36	48	80	131	396	3	12	
6	5	3	3	7	10	22	10	16	7	8	97	6	6	
17	15	9	13	21	10	21	15	11	15	14	161	4	6	
45	29	24	24	27	24	26	19	18	19	16	271	4	11	
3	2	2	2	3	..	4	4	4	4	4	32	4	1	
29	33	17	37	36	38	34	19	25	25	20	313	8	25	
73	62	68	71	55	47	38	31	35	27	16	523	4	21	
2,252	2,061	1,721	1,637	1,492	1,444	1,433	1,297	1,367	1,433	1,552	17,689	....	852	

Table IV—A Recapitulation of the Total Number, and Number Between Ages 20 and 74, inclusive, of Male Deaths in the Registration Area of the United States in 1908 from Each of 106 Causes; the Number of Male Deaths between Ages 20 and 74, inclusive, from These Causes Directly or Indirectly Due to Alcohol on the Basis of the *Average Percentage Estimates* of the Medical Directors of Three Leading Insurance Companies; and the Ratios of These Deaths to (1) the Total Number of Male Deaths at All Ages from These Causes and (2) to the Number of Male Deaths between Ages 20 and 74, inclusive, from these Causes.

Causes of Death in Each Group	Three Groups of Deaths from Causes in which Alcohol May Have Been Principal Causative Factor, or Con- tributory Factor	Total Male Deaths from These Causes		Male Deaths between Ages 20-74, inclusive, Presumably Due Directly or Indirectly to Alcohol		
		At All Ages	Between Ages 20-74 inc.	Number	Ratios to Male Deaths	
					At All Ages	Between Ages 20-74, inc.
28	Causes of Death in the Case of which Alcohol May Have Been an Important Contributory Factor, and sometimes the Principal Causative Factor	107,586	73,747	18,337	17.0	24.9
48	Causes of Death in the Case of which Alcohol May Have Been a Minor Con- tributory Cause, or at least a Distinctly Disturbing Factor ..	174,244	107,422	13,664	7.8	12.7
30	Causes of Death in the Case of which Alcohol Was Not Primary or Second- ary Cause but May Have Been a Harm- ful Contributory Fac- tor	38,300	17,689	852	2.2	4.8
106	Causes of Death	320,130	198,858	32,853	10.3	16.5

As will at once be noted in Tables I, II and III, the several estimates of the percentage of male deaths from the various causes presumably in whole or in part due to alcohol have been tabulated under the anonymous headings of "Dr. X.," "Dr. Y.," and "Dr. Z." instead of the names of the physicians from whom the estimates were received. The computation of the probable number of deaths in each case directly or indirectly due to alcohol being based on the *average* of the three physicians' percentage estimates, no useful purpose would have been served by revealing the authorship of the individual columns of percentage estimates, doubtless more or less people differing with this or that estimate would have felt called upon to subject the physician from whom it emanated to correspondence on the subject, and from every point of view it therefore seemed desirable to conceal the individual responsibility for the several lists of estimates.

That the estimates widely differ in most cases was confidently to have been expected, as no two physicians look at the exceedingly complex question of the relations of alcohol and mortality in precisely the same light. There is the widest difference of opinion on various phases of this subject among equally competent medical men, one of whom may be inclined to dismiss from any calculation of mortality due to alcohol all deaths in which alcohol did not more or less directly figure, whereas another physician of no less broad training and experience may view the question from a different angle and hold the extremely moderate use of alcohol indirectly responsible for deaths in which it played no direct part, but for which it was indirectly responsible in having so shaped the antecedent circumstances as, for instance, to lead to the contraction of the disease resulting in death. Taking into account such fundamentally different ways of looking at the subject, and the innumerable sidelights by which this or that physician may or may not be moved in arriving at his conclusions, it is apparent that the widest range of variation of estimates as to the direct or indirect responsibility of alcohol for male deaths from a long list of individual causes is inevitable when two or more physicians are asked to tabulate their opinions without consultation.

As I believe I have previously stated, the differences in

the estimates accompanying this paper are so pronounced in many cases as to make the resultant averages much more representative of medical opinion at large than would they have been had the three physicians from whom these particular estimates come unfortunately happened to have substantially identical views. In fact, as the tables emphatically prove, the averages in many cases are so far removed from the extremes which figure in their computation that I am strongly inclined to doubt if any material differences would have been shown in the final results of the entire tabulation if the averages had been based on the estimates of three hundred, instead of three, thoroughly-experienced and broad-minded physicians. As a rule, there is a vast amount of difference in the reliability of averages respectively based on three and three hundred sets of observations, but when it so happens that there are extreme differences in the former case the averages of those extremes are very apt to take the form of exceedingly broad averages.

In a general way, it will be observed that the most pronounced differences in the percentage estimates presented in the preceding tables are to be found in the groups of causes of death with which alcohol is only indirectly associated, the tendency toward comparative agreement naturally being more in evidence in the case of the first group of causes of death "in the case of which alcohol may have been an important contributory factor, and sometimes the principal causative factor." For instance, in the case of deaths due to Alcoholism, of course all three estimates stand at 100 per cent., in the matter of deaths due to Diseases of the Arteries the average of 28 per cent. varies by only 7 points from the highest estimate—and two of the three estimates agree on 20 per cent.—in the case of deaths from Bright's Disease the average of 30 per cent. is identical with one of the estimates, and is the mean of the two other estimates. In some cases the differences in estimates are strikingly large, but in those where the number of deaths hypothetically charged to alcohol is comparatively large it will be noted that the resultant average is generally in close conformity with at least one of the three estimates, so that in almost every case the number of deaths worked out on the basis of the average of estimates is much

the same as it would have been had it been computed on the basis laid down by at least one authority on the subject.

The tables which have been presented of course show in detail the percentage and number of male deaths between ages 20 to 74, inclusive, in the Registration Area of the United States hypothetically due in whole or part to alcohol, but a clearer view of the principal factors of the mortality associated with alcohol is afforded by the appended recapitulation of the figures for those causes in the case of which at least 500 male deaths in 1908 were due to alcohol according to the averages of the three estimates on which the previous tabulations were based. The figures in question are as follows:

Table V—A Summary of the Male Deaths Presumably Due to Alcohol in the Registration Area of the United States in 1908, in the Case of the More Important Causes of Death.

Causes of Death	Total Male Deaths between Ages 20-74, inclusive, from these Causes	Male Deaths from these Causes, between Ages 20-74, inclusive, Presumably Due in Whole or Part to Alcohol	
		Number	Percentage of Total
Bright's Disease	17,513	5,254	30%
Tuberculosis of Lungs.....	33,900	4,068	12
Heart Disease	22,887	3,662	16
Pneumonia (lobar and unqualified)	14,044	3,090	22
Cirrhosis of Liver.....	4,123	2,762	67
Apoplexy	11,748	2,585	22
Alcoholism	2,025	2,025	100
Suicide	6,035	1,388	23
Diseases of Arteries....	2,803	645	23
Other Accidental Injuries	5,163	516	10
Paralysis	2,329	512	22
Totals.....	122,570	26,507	21.6%

By reference to the summary of the deaths from all the 106 causes in which alcohol presumably figured to some extent as a factor it will be seen that the total number of those deaths was 32,853, and it will therefore be apparent that the 26,507 deaths from the 11 causes included in the above tabulation constituted 80.7 per cent. of the total of male deaths between ages 20-74, inclusive, in the case of which alcohol was supposedly a causative or contributory factor.

CHAPTER VIII

A COMPARISON OF THE RESULTS WITH THOSE OF THE HARVEIAN SOCIETY'S INQUIRY

THE preceding recapitulation of the principal factors in the mortality in which alcohol presumably figured offers an opportunity for an exceedingly interesting comparison of the results of this investigation of the mortality of the United States in 1908 with those of the Harveian Society's investigation of the mortality of London in 1879-1882, a brief account of which has already been included in this paper. As has been stated, the pioneer investigation of the mortality of alcohol by Mr. Neison, the British actuary, about the middle of the last century, and that conducted by the Collective Investigation Committee of the British Medical Association in 1885-6, were so radically different in scope and plan from that of the Harveian Society that no comparison of the results of the three examinations would be practicable; and that being the case, of course the findings of this investigation of the mortality of alcohol in the United States cannot be compared with those of Mr. Neison's investigation or those of the British Medical Association's inquiry.

In the case of the Harveian Society's inquiry, however, as in this investigation, the primary purpose was to endeavor to ascertain the extent of mortality referable to alcohol, and in a general way the results of the two studies of the subject are therefore fairly comparable. The methods of attaining the common goal were radically different, to be sure, the former investigation being based on the classification by physicians in private practice, workhouse infirmaries and lunatic asylums, hospitals and inquest reports of all deaths at adult ages as (A) deaths in no wise due to alcohol, (B) deaths accelerated or partly caused by its abuse, and (C) deaths wholly due to it, whereas in this investigation the findings are based on an average of physicians' estimates of the respec-

tive percentages of male deaths between ages 20 and 74, inclusive, due in whole or part to alcohol in each of 106 specific causes of death. The former inquiry included female, as well as male deaths, and those at all ages from 20 upward; the latter has included only male deaths, from 20 to 74, inclusive. Furthermore, the classification of causes of death employed by the Harveian Society in 1879-1882 was naturally somewhat different from the International Classification of Causes of Sickness and Death, revised down to 1910, which I have employed in this investigation. Notwithstanding these points of dissimilarity, the two investigations have the all-important common ground of unity of purpose, a substantial readjustment of the more important differences in methods of tabulation is practicable, and by smoothing out the dissimilarities it is possible to effect at least a fairly accurate comparison of the net results of the two inquiries.

As may be noted by reference to the résumé of the Harveian Society's investigation on previous pages of this paper, reports on 10,000 male and female deaths at 20 years of age and upward in London were obtained, and of that number 1,402 deaths, or almost exactly 14 per cent. of the total deaths, were classified as in Groups B and C, i. e. accelerated by, or partly or wholly due to, alcohol. The enumeration of the deaths in Classes B and C due to the more important causes, as presented in "Table III" of the Harveian Society's report is herewith reproduced, together with a corresponding compilation of the male deaths in the Registration Area of the United States in 1908, between ages 20 and 74, inclusive, from similar causes presumably in whole or part due to alcohol:

Table VI—A Comparison of the Ratios of the Harveian Society's Inquiry and This Investigation for Certain Leading Groups of Causes of Death in which Alcohol Conspicuously Figures.

Causes of Death	Deaths Partly or Wholly Due to Alcohol			
	According to Harveian Society's Investigation of London Mortality in 1879-1882 (male and female)		According to This Investigation of Mortality of Registration Area of the United States in 1908 (male only)	
	Number	Percentage	Number	Percentage
All Causes	1,402	100.0	32,853	100.0
Pneumonia and Pleurisy	81	5.7	3,120	9.5
Bronchitis, Asthma, Emphysema and Congestion of Lungs	118	8.4	277	.8
Phthisis	134	13.1	4,068	12.4
Heart Disease	89	6.35	3,662	11.1
Chylopoietic Viscera (diseases of)	314	22.4	3,402	10.4
Nervous Diseases ...	239	17.0	4,092	12.5
Kidney Disease, Albuminuria, Uremia.	95	6.77	5,636	17.2
Totals.....	1,120	79.9	24,257	73.8

With the single exception of "chylopoietic diseases" all of the classifications used by the Harveian Society in the above tabulation are included in the International Classification of 1910 and the comparison of deaths as listed in the showings of the two investigations is readily computable with that one exception. The International Classification of 1910 affords no clue as to the causes of death presumably included by the Harveian Society under the heading of "chylopoietic viscera, diseases of," and I have been advised by some medical authorities to whom I have referred the matter that practically all of the diseases included under the sub-title of Diseases of the Digestive System in the International Classification of 1910 may fairly be included as diseases of the chylopoietic viscera, and in the above comparison have therefore considered under that heading deaths due

to diarrhea and enteritis, cirrhosis of the liver, gastritis, appendicitis, ulcer of the stomach, biliary calculi, diseases of the spleen, etc.

The most noteworthy result of the comparison is the close agreement of the final percentages, 73.8 per cent. of the deaths scheduled in the tabulations of this investigation as traceable in part or whole to alcohol being due to the seven groups of causes named in the above comparison, and 79.9 per cent. of the deaths so listed by the Harveian Society being chargeable to these seven groups of causes. To be sure, the latter showing includes both male and female deaths at all ages from 20 upward, whereas my investigation includes only male deaths between 20 and 74, inclusive, but the variation in the final percentages is comparatively slight. In the case of the percentages of individual groups of deaths some of the variations are pronounced, as for instance in the case of deaths due to bronchitis, asthma, etc., heart disease, digestive diseases, and kidney diseases; phthisis (or tuberculosis of the lungs) being the only important item in which the percentages are substantially uniform. It must be borne in mind, however, that the Harveian Society's returns deal only with the mortality of London, and in the years 1879-1882, whereas those of the other investigation are for the entire Registration Area of the United States, in the year 1908. In a general way, a pronounced decrease in the percentage of deaths from respiratory diseases in the last thirty years might have been looked for, and—especially in the United States—a sharp increase in that same period in the percentage of deaths due to heart disease, Bright's and other diseases of the kidneys. Consequently, in the main, the discrepancies between the two sets of percentages for deaths in 1879-1882 in London presumably due in part to alcohol and those in the United States in 1908 are on lines which might have been anticipated. And grouping together the principal causes for death in which alcohol is supposed to have figured, it is noticeable that the final percentages of the two investigations are in substantial accord.

The foremost purpose of both investigations was to arrive at an approximation of "the extent of mortality referable to alcohol, and its proportion to the mortality from all causes,"

and the all-important comparison to be made between the results of the two investigations is that of their final showings on these two fundamental points. The natural question for anyone who has read this paper up to this point to ask, is, how does the final conclusion of the mortality in the United States presumably due in whole or part to alcohol, according to the methods of computation employed in this investigation, compare with what might have been expected on the basis of previous investigations? Any and every latter-day investigation of any important subject is foredoomed to be subjected to searching comparisons with previous investigations on similar lines; and if its results pronouncedly differ from those of previous inquiries, its sponsors must either be able conclusively to prove that there was some vital error in the prior conclusions or rationally account for the discrepancies in findings, or else have their own conclusions generally discredited. What are the results when such a test is applied to the results of the investigation of the mortality of alcohol in the United States which I have conducted on lines fundamentally different from any previously employed? That question is an eminently fair one, and one which I shall endeavor to answer without the slightest evasion or concealment of any discrepancies which may develop.

CHAPTER IX

THE LACK OF ANY SPECIFIC AMERICAN DATA WITH WHICH COMPARISON CAN BE MADE

IN the first place, the results of my investigation cannot be compared with those of any previous investigation on similar lines in this country, for the reason that no inquiry of the kind has heretofore been made in the United States. I make this statement without reservation, not only as the result of my own search of the bibliography of the subject, but on the strength of the positive declaration to that effect by those accepted authorities, Dr. John S. Billings and Mr. John Koren, both of whom played important parts in the comprehensive inquiry of the far-famed Committee of Fifty to Investigate the Liquor Problem, in 1893-1903. Up to date there have been but three investigations of the subject, worthy of the title, in any other English-speaking country, and of the three previously conducted in England to which I have referred that of the Harveian Society is the only one on lines in any way similar to those followed in this investigation. Consequently, in so far as conformity or non-conformity with the results of any previous similar investigation is concerned, the final showings of this investigation must stand or fall by comparison with the net results of the Harveian Society's inquiry in London in 1879-1882.

According to that investigation, almost exactly 14 per cent. of the adult mortality of London, both male and female, a generation since, was partly or wholly due to alcohol; what percentage of the adult mortality of the United States in 1908, both male and female, was due to alcohol according to the showing of this investigation? According to the previous tabulations of male deaths only, between ages 20 and 74, inclusive, 32,853 of the 198,858 male deaths between those ages from the 106 causes of death included in the tables were in whole or part due to alcohol, or, in other words, 16.5 per cent. of the total number of deaths in question. But of course the per-

centage of male deaths between 20 and 74, inclusive, from only certain specified causes cannot properly be compared with the percentage of *all* deaths from *all* causes at age 20 and upwards, in the case of which both sexes are considered. Before taking female deaths into account, suppose that the percentage of male deaths from all causes from 20 upward is worked out on the basis of this investigation's showing. The 32,853 deaths from one or other of the 106 causes of death listed are presumably all the male deaths in the Registration Area in 1908 from any and all causes in which alcohol appreciably figured. As is shown by Table 6 in the Mortality Statistics for 1908 (pp. 474-481), there were 375,497 male deaths from all causes at all ages in the Registration Area in 1908, and 248,105 of these deaths were at age 20 and upward. Dividing the 32,853 deaths charged to alcohol in the previous tabulations by the total of male deaths at 20 and upwards, it is evident that the male deaths in which alcohol presumably figured constituted 13.2 per cent. of the total of male deaths from all causes at all ages from 20 upward. The Harveian Society's percentage of both male and female deaths from age 20 upward presumably due to alcohol, it will be remembered, was 14, so that the two percentages would be substantially identical were male deaths only included in the case of the United States figures and both male and female deaths in the case of the London figures. How does the comparison work out when allowance is made for female deaths presumably due to alcohol in the case of the United States figures?

For reasons previously stated, the physicians on whose estimates this investigation is based deemed it undesirable to include female deaths in determining their respective percentages of deaths from the various causes in which alcohol might have figured. By consultation with them and other physicians, however, I find there is substantial agreement that the percentage of female deaths in the United States directly or indirectly due to alcohol unquestionably is much lower than that in Great Britain. In fact, all available data justify the conclusion that that class of female deaths in this country is scarcely to be compared with those on the other side of the Atlantic. For instance, in most parts of this country the presence of women in saloons is not tolerated, and in some

States is specifically prohibited by statute. With the single exception of the limited class of women of the underworld who are more or less in evidence in the back-rooms of saloons in large cities, women are rarely to be seen entering saloons in American cities, whereas in London perhaps half as many female as males openly frequent the saloons.

Even were the comparison restricted to the foremost metropolitan cities of the two countries, all travelers familiar with the drinking conditions of London and New York will certify to the fact that the relation of women and saloons in the two great metropolitan cities is fundamentally different. And this conclusion is strongly corroborated by the vital statistics for the two cities. In 1908, for instance, 391 deaths in London were charged up to alcoholism and delirium tremens, of which 199 were male, and 192 female, deaths, thus making the ratio of female to male deaths 96.5 per cent. In that same year in the City of New York 409 deaths were attributed to alcoholism, acute or chronic, of which 329 were male, and only 80 female, deaths, thus making the ratio of female to male deaths from this cause 24.3 per cent. In other words, the ratio of female deaths to male deaths from alcoholism in 1908 apparently was nearly four times as high in London as in New York, and an examination of the vital statistics of London for several preceding years shows that the figure for 1908 was in no sense an abnormal one.

According to *La Revue des Assurances*, of Brussels, about three years ago "the police in London were ordered to attend for several hours at certain bars, and note the number of women entering. In the course of four hours 39,541 women and 10,746 children visited the saloons of the capital. The results of this investigation are presented in a report published by the Home Secretary." In this country the sale of liquor to minors is universally prohibited, and, making due allowance for the enormous population of the greatest city in the world, the visitation of more than 50,000 women and children to the saloons of London within four hours can only be construed as indicating a materially higher percentage of female mortality from alcohol in London than in either the metropolis of this country, or the United States at large. And, it must be remembered that the female mortality from alcohol

which figures in the report of the Harveian Society's investigation is solely based on returns for the city of London.

This assumption of a much higher female mortality from alcohol in the United Kingdom than in the United States is abundantly supported by official figures. The 71st Annual Report of the Registrar-General of England and Wales charges up 1,937 deaths in 1908 to alcoholism and delirium tremens, of which 825, or 74.2 per cent. of the number of male deaths, were those of females. In the same year in the Registration Area of the United States only 264 of the total of 2,348 deaths from alcoholism, or 12.7 per cent. of the number of male deaths, were those of females.

If these ratios of female to male deaths from alcoholism were to be taken as the relative measures of female mortality from alcohol in the United States and England and Wales, the British rate would be almost six times as high as that of this country. And, after discussing the subject at length with health officials and various authorities who have the best possible sources of information, I have come to the conclusion that an assumption that the rate of female mortality from alcohol in this country certainly does not exceed twenty per cent. of the male rate would be an entirely safe—if not an excessive—one. That is equivalent to assuming that for every five male deaths in this country in which alcohol figures as a causative or contributory factor there is, proportionately, one female death; and I believe that any man, physician or layman, who carefully considers this tentative proposition, runs over in his mind all the deaths of which he has had personal knowledge, and tries to figure how many of the female deaths could possibly be attributed to alcohol, in comparison with the male deaths in which alcohol figured, will agree that the assumed ratio of one to five is by no means an understatement of the probable facts.

Once a basis for calculating the female mortality from alcohol in this country has been laid down, it is an easy matter to calculate in round figures the number of female deaths in the Registration Area in 1908 which must be charged up to alcohol in conjunction with the findings of the three medical directors' percentage estimates of male deaths from various causes in which alcohol presumably figured. The male deaths

in question having constituted 13.2 per cent. of the total number of male deaths from all causes at age 20 and upward, the percentage of female deaths directly or indirectly due to alcohol would have been one-fifth of that figure, or 2.6 per cent. of the total number of female deaths from all causes at age 20 and upward. As is shown by Table 6 in the Mortality Statistics for 1908, the total number of female deaths from all causes at age 20 and upward in the Registration Area was 209,049, and if 2.6 per cent. of these deaths were directly or indirectly due to alcohol, the female alcoholic mortality of the Registration Area in 1908 would have amounted to 5,435 deaths. Adding this number to the presumable 32,853 male deaths computed on the basis of the physicians' detailed estimates, the total mortality (of both sexes) in the Registration Area in 1908 in which alcohol may have played some part would seem to be fixed at 38,288. By the simple process of dividing this figure by 457,154, the total number of both male and female deaths from all causes at age 20 and upward, the ratio of deaths in which alcohol presumably figured is fixed at 8.4 per cent. of the entire number of deaths at adult ages in the Registration Area.

By referring to "Table II" in the summary of the results of the Harveian Society's investigation it will be found that of the 1,402 deaths ascribed in whole or part to alcohol 903 were male, and 499, female, deaths, thus making the ratio of female to male deaths 55.26 per cent. As has previously been observed in this paper, in his contribution to the composite work on "The Drink Problem in Its Medico-Sociological Aspects," published in 1907, Dr. Arthur Newsholme, in referring to deaths from alcoholic indulgence, states that "for every 100 such deaths among men, there are, according to the English experience, 81 among women." The basis on which this statement rests is not stated by Dr. Newsholme in the context, but presumably his calculation in 1907 of the relative percentage of male and female deaths traceable to alcohol—being stated in the present tense—is based upon recent returns, in other words for those of the early years of the present century.

Obviously, therefore, his estimate of the relative percentage of male and female mortality in England due to alcohol cannot properly be applied to a comparison of the English figures of the Harveian Society's investigation in the late 70's, or early 80's,

of the last century with the United State figures for 1908, and to place the results of the two investigations on a common basis the ratio of female to male deaths shown by the Society's investigation—and not Dr. Newsholme's ratio—must be applied to the United States figures. A recapitulation of the presumable total number of deaths of both sexes in which alcohol figured in the Registration Area of the United States in 1908—with the female deaths in this class computed on the basis of twenty per cent. of the male death-rate—and a comparison on the basis of the Harveian Society's ratio of 55.26 female deaths for each 100 male deaths, reads as follows:

Table VII—A Résumé of Total Deaths at All Ages in the Registration Area of the United States in 1908, Total Deaths of Both Sexes from All Causes from Age 20 Upward and Presumable Number and Percentage Due to Alcohol, and a Comparison of These Figures with Those Which Would Have Resulted on the Basis of the Harveian Society's Calculation of the Ratio of Female to Male Deaths.

Classification of Deaths	Male	Female	Total
Total deaths at all ages from all causes..	375,497	316,077	691,574
Total deaths, ages 0-19, inclusive.....	127,392	107,028	234,420
Total deaths, age 20 and upward.....	248,105	209,049	457,154
Total deaths in which alcohol presumably was a causative or contributory factor..	32,853	5,435	38,288
Percentage of total deaths from all causes at age 20 and upward in which alcohol presumably figured as a factor.....	13.2	2.6	8.4
Total deaths which would be chargeable to alcohol if female deaths were computed on basis of the Harveian Society's ratio of 55.26 female deaths for each 100 male deaths	32,853	18,155	51,008
Percentage of total deaths from all causes at age 20 and upward in which alcohol presumably figured as a factor, on this basis	13.2	8.7	11.2

This recapitulation of the results of this investigation of the presumable alcoholic mortality of the Registration Area

of the United States in 1908 fixes the percentage of the total mortality of both sexes at adult age (20 years and upward) in which alcohol supposedly figured at 8.4, as contrasted with a percentage of 14 for the mortality of London, a generation ago, as shown by the investigation of the Harveian Society in 1879-1882. Were the ratio of female to male deaths shown by the last-named investigation to be applied to the figures for the United States, the alcoholic mortality of the Registration Area of this country would have amounted to 11.2, instead of 8.4, per cent. of the total mortality of both sexes from all causes at adult ages. In either case, the ratio of alcoholic mortality in the United States in 1908 would seem to have been materially lower than that of London a generation ago, as measured by the Harveian Society's investigation. Is or is not this apparent decrease a probable one in view of the most authentic data now obtainable? In other words, does it confirm the plausibility of this statistical approximation of the mortality of alcohol in the Registration Area of this country in 1908, and indicate a material improvement in latter-day conditions in this country as compared with those prevailing in London a quarter-century and more ago, or does it raise serious question as to the results of this investigation?

CHAPTER X

MATERIAL DIFFERENCES IN THE CONDITIONS OF THE TWO INVESTIGATIONS

IN considering this important question, three essential differences between the two investigations must be given due weight; first, the fact that the Harveian Society's compilations not only dealt solely with urban mortality, but with the urban mortality of the largest city in the world, whereas 35.2 per cent., or more than one-third of the mortality of the Registration Area of the United States in 1908, on which this investigation is based, was rural mortality; secondly, the former investigation deal with the mortality of, say, 1880, or that of practically a generation before the year whose mortality figures in the later investigation; thirdly, the Harveian Society's conclusions were based upon only 10,000 deaths, returns for about one-quarter of which came from workhouse infirmaries and lunatic asylums, hospitals and inquest reports, whereas the returns of this investigation are based upon the *average* of percentage estimates for each of 106 specific causes of death furnished by three eminent Medical Directors of insurance companies, who have given especial attention to the study of the relations of alcohol and mortality for many years. For obvious reasons, the death-rate in rural districts, the world around, is invariably lower than that of cities; in 1908, the corrected death-rate for rural counties of England and Wales was 12.596 per 1,000 as contrasted with one of 16.132 for urban counties, the rural death-rate therefore being 21.9 per cent. lower than the urban death-rate in that year (see p. lxxxi, Seventy-first Annual Report of the Registrar-General for England and Wales). In the Registration Area of the United States in that same year, the death-rate for the rural part of the Registration States was 13.960 per 1,000 as compared with one of 16.546 for the cities in the Registration States, the rural rate therefore being lower than the urban rate by 15.6 per cent.

These differences between the urban and rural death-rates in 1908 were by no means abnormal, and a much lower alcoholic death-rate for an area in which more than one-third of the mortality was rural than for the city of London might confidently be expected on the ground of the lower rural death-rate, even were the two sets of returns for the same year, instead of for periods nearly thirty years apart, and no peculiarly urban factors involved in one instance as manifestly is the case when mortality due to alcohol is considered. Even were an equally large percentage of the rural community of both sexes disposed to drink alcohol—which would be an unfounded assumption—the comparative paucity of facilities for drinking and the inaccessibility of drinking-places would make practically impossible anything like as large a death-rate from alcohol in the rural districts as in the cities. Other things being even, a much lower death-rate from alcoholic influence might be looked for in the case of an area more than one-third of whose population was rural than in the case of a great city, and especially a city like London.

In the second place, the Harveian Society's estimate that 14 per cent. of the adult mortality of both sexes was in whole or part due to alcohol was based on mortality returns for, say 1880, whereas the conclusions of this investigation rest on death returns for 1908, twenty-eight years later. In 1880 the corrected death-rate of England and Wales was 19.5 as against one of 14.7 in 1908, the latter being lower than the former by 24.6 per cent. The mortality returns of the United States for 1880 as presented in the reports of the Tenth Census were practically worthless as a means of computing the death-rate of the country in that year, being utterly incomplete; but there is no question about a substantial decrease of the country's death-rate in the intervening twenty-eight years, and in all probability the actual decrease was relatively almost if not quite as large as that in the case of England and Wales. A decrease in the death-rate of course means a corresponding increase in the average length of life, or average age at death, and on account of the decrease in the general death-rate, if for no other reasons, a decrease in the alcoholic death-rate in 1908 as compared with that for 1880 might have been expected, providing no counteracting conditions had developed in the meantime.

Had such conditions developed in the interval between 1880 and 1908? No positive answer to that question can be made, and widely differing answers will doubtless be made by persons strongly prejudiced either one way or the other. Neither side to the controversy can prove its case; the answer to the question at best can be but a matter of opinion. In so far as the purpose of this investigation is concerned, the question is not as to the per capita production and consumption of alcohol in the United States in 1908 as contrasted with that of twenty-eight years before, but rather as to whether the drinking habits of the community at large have changed so as presumably to increase or decrease the percentage of the total adult mortality which may properly be charged to alcohol. The general impression of unbiased commentators on the drinking habits of to-day as compared with those of twenty-five, or fifty, years ago, seems to be that there undoubtedly has been a decrease in the percentage of the community addicted to reckless drinking; and I think there can be no question whatever as to such a decrease, especially in England, if the comparison is made with the conditions of, say, even fifty years ago.

In so far as figures for the per capita consumption of alcoholic beverages in the United States are concerned, those presented in the Statistical Abstract of the United States, annually issued by the Department of Commerce and Labor, undoubtedly are the most authoritative, and the appended returns for the year 1880 and subsequent periods are cited from the thirty-second number of that annual (page 749), issued in 1910:

Table VIII—The U. S. Goverment's Figures for the Total and Per Capita Consumption of Wines and Liquors in This Country by Years.

Year	Wines		Malt Liquors		Distilled Spirits		Total Consumption of Wines and Liquors	
	Gallons	Per Cap.	Gallons	Per Cap.	Gallons	Per Cap.	Gallons	Per Cap.
1880	28,098,179	.56	414,220,165	8.26	63,526,694	1.27	505,845,038	10.08
1885	21,905,712	.39	596,102,038	10.62	71,416,709	1.27	689,424,459	12.28
1890	28,945,993	.46	855,929,559	13.67	87,829,623	1.40	972,705,175	15.53
1895	20,863,877	.30	1,043,033,486	15.13	78,655,063	1.14	1,142,552,426	16.57
1900	29,988,467	.39	1,222,387,104	16.02	97,356,864	1.28	1,349,732,435	17.69
1905	35,059,717	.42	1,538,526,610	18.50	120,869,649	1.45	1,694,455,976	20.38
1908	52,121,646	.60	1,828,732,448	20.98	125,379,314	1.44	2,006,233,408	23.02

The above tabulation indicates an increase of about 128 per cent. in the per capita consumption of alcoholic beverages in the United States in the twenty-eight year interim between 1880 and 1908, but it will be observed that the average consumption of wines increased only from .56 to .60 gallons, and that of distilled spirits only from 1.27 to 1.44 gallons, per person. The total consumption of malt liquors, however, more than quadrupled, the per capita consumption increasing by about 154 per cent. At first thought, these figures might seem to indicate a decided increase in the average consumption of alcohol by the American people, but the percentage of alcohol in beer is lower than in any of the other alcoholic beverages and consequently the apparent per capita increase in the amount of alcohol annually consumed by the drinking population of the United States in the twenty-eight years ending with 1908 is more apparent than real.

Mulhall calls attention to the fact that "on this subject G. R. Porter gives good reasons that the consumption of alcohol affords no evidence as to intemperance. This is confirmed by the fact that, although convictions for drunkenness per 1,000 inhabitants are much higher in Ireland than in England, the consumption of alcohol is one-third less." Mulhall's *Dictionary of Statistics* shows that the per capita consumption of alcohol is much greater in the United Kingdom than in this country, the consumption of liquor per person as measured by its equi-

valent in alcohol having been 2.10 gallons in the United Kingdom in 1871-1880, as compared with 1.14 gallons in the United States in 1880. And, making allowance for the extensive use of cider of this country, Mulhall calculates that the per capita consumption of alcohol in the United States in 1889 was only about 1.34 gallons as against 1.88 gallons in the United Kingdom. The statistics published by the Board of Trade of Great Britain and Ireland state that in 1900 the per capita consumption of absolute alcohol was 2.08 gallons in the United Kingdom and 1 gallon in the United States. On the basis of Mulhall's figures for 1889, the per capita consumption of alcohol in the United Kingdom was more than 40 per cent. greater than that of the United States, and according to the Board of Trade's figures, in 1900 the per capita consumption of the United Kingdom was more than twice that of the United States. The per capita consumption of alcoholic beverages may not be an entirely reliable measure of the relative amount of intemperance in the various countries, but the figures above cited would seem to confirm, in a general way at least, the common belief that the drinking habit is much more prevalent in the United Kingdom—more especially in England—than in the United States.

In brief, all authentic evidence now obtainable justifies the assumption that both the use of alcohol and the mortality resulting from its use are much more general in the case of England than in the United States, and, remembering that the Harveian Society's figures were based solely on the alcoholic mortality of London nearly thirty years ago, it would seem inevitable that the alcoholic mortality of the United States in 1908 would show a decidedly lower percentage of the total adult mortality. Furthermore, a fair consideration of the improved conditions of modern life, the vastly-increased knowledge of and facilities for sanitation and medical treatment, and the increased prosperity of the masses of the population of this country, in the case of which moderation is an important factor, can lead only to the conclusion that the percentage of immoderate drinkers has decidedly decreased in the last generation. In other words, the evidence available tends to indicate a probable decrease of late years in the percentage of mortality directly or indirectly due to alcohol.

When the results of the Harveian Society's investigation and

this investigation are compared, the fundamental difference in the methods employed must be considered, and I venture to believe that, for various reasons already stated at some length, the conclusions of this investigation rest upon a much sounder and broader basis than did those of the London investigation in 1879-1882. Taking into account all of the several reasons for anticipating the finding of a much lower percentage of alcoholic mortality in the Registration Area of the United States in 1908 than was found in the London inquiry of a generation ago, it would seem that the percentage of 8.4 in the former case as compared with that of 14 per cent. in the case of the Harveian Society's investigation is fairly representative of the different conditions and the much later period with which this investigation has dealt.

CHAPTER XI

AN APPROXIMATE COMPUTATION OF THE TOTAL MORTALITY OF THE UNITED STATES

As yet no reliable figures for the total mortality of the United States are obtainable, the Mortality Statistics annually issued by the Bureau of the Census dealing only with returns from the Registration Area, which in 1908 included seventeen States, 78 Registration Cities in Non-Registration States, and the District of Columbia. This area contained an estimated population of 45,028,767, or 51.8 per cent. of the estimated total population of Continental United States, namely, 86,874,990. In default of registration figures for the balance of the country, the mortality of the remaining 41,846,223 residents of Continental United States, living in the Non-Registration Area, is unknown, but may be approximated by first dividing this total into presumable city and rural populations, and then applying to those figures the mortality ratios for 1908 of the city and rural populations of the Registration Area, which respectively were 1,624.3 and 1,396 per 100,000.

The latest detailed estimates of population for all cities and towns in the United States presumably having as many as 8,000 residents which are now available are those presented in Bulletins 20 and 45 issued by the Bureau of the Census in 1905-6, and show that the Registration Cities of 1908 included every city in Continental United States having as large a population as 65,000 on June 1, 1903, and about 90 per cent. of all cities of 8,000 or more population. The Bureau of the Census makes this latter figure the dividing line between urban and rural populations, including all cities and towns of less than 8,000 in the classification of rural population. The 27,588,740 population in the cities of the Registration Area in 1908 having presumably constituted at least 90 per cent. of the total urban population, it appears that the entire urban population of Continental United States in that year footed up 30,654,156; and by subtracting from this presumptive total the urban population of the Registration Area the urban

population of the Non-Registration Area is fixed at approximately 3,065,416. The difference between this figure and the supposed total population of the Non-Registration Area, computed by the Bureau of the Census as 41,846,223, of course is the presumable rural population of that area, to wit, 38,780,807, and the approximate urban and rural elements in the population of the Non-Registration Area being thus calculated, it is possible to compute the presumptive mortality of the entire country in 1908 by the method above outlined. By a similar process the probable number of deaths at adult ages (age 20 and upward) may be computed, the deaths in this class having constituted respectively 64.7 and 68.7 per cent. of the deaths at all ages in the cities and rural districts of the Registration Area.

To be sure, quite a large percentage of the colored population of the country is located in the rural sections of the Non-Registration States, and this method of calculating the approximate mortality of the entire country makes no allowance for the unquestionably-higher mortality of that element of the population of the Non-Registration Area. With the single exception of the rural mortality of Maryland, however, practically no exact data as to the colored mortality in rural districts are now available, and as the colored mortality of most of the leading cities of the South has been included in the computation of the mortality ratios of the cities of the Registration Area, the application of this combined white and colored urban mortality ratio to all the cities of the Non-Registration Area to a certain extent offsets the inability to take the colored mortality into account in applying to the rural population of that area the rural mortality rate of the Registration Area. With this single exception, the calculation of the approximate mortality of the Non-Registration Area—and that of the country as a whole, by addition of this mortality to that of the Registration Area—would seem to promise reasonably exact figures, the exceptionally low rural mortality of the Western States in the Non-Registration Area probably largely if not entirely counterbalancing the presumptively higher rural mortality in some if not all of the Southern States in the Non-Registration Area.

The method of arriving at the approximate mortality at all

ages, and at age 20 and upward, for the entire country having been explained, it only remains to establish a sound basis for calculating the probable mortality of the Non-Registration Area in which alcohol directly or indirectly figured—on the basis of the three physicians' percentage estimates for deaths in the Registration Area—and the approximate alcoholic mortality of the entire country in 1908 may then be worked out in round numbers. As will be obvious at first thought, it would inevitably lead to false conclusions were the supposed alcoholic mortality rate of 8.4 per cent. of all deaths at age 20 and upwards in the case of the Registration Area, with its 61.3 per cent of city population applied to the total adult mortality of the Non-Registration Area, with its 7.3 per cent. urban, and 92.7 per cent. rural, population. No argument would be needed to satisfy any reasoning person that the percentage of deaths in which alcoholic indulgence either directly or indirectly figured would of course be much smaller in rural districts than in cities; the only question, it seems to me, would be as to just how the relative percentages of deaths of this class in cities and rural districts could be established on any reasonable basis. The answer, I venture to believe, is to be found in the text of Dr. T. H. C. Stevenson's authoritative "Analysis of the Causes of Death in England and Wales," which appears in the Seventy-First Annual Report of the Registrar-General of England and Wales. Under the heading of "Alcoholism and Cirrhosis of Liver," Dr. Stevenson says in the report in question (p. cv): "It has been frequently stated in these reports that the deaths actually assigned to alcoholism or to delirium tremens form an imperfect measure of the mortality caused by alcoholic intemperance, and that the best available indication is probably furnished by the combined mortality from alcoholism and cirrhosis of the liver". I find that all of the American physicians with whom I have discussed the subject agree with Dr. Stevenson that this method of attempting to measure the mortality of alcohol is much more reliable than one taking into account only the deaths actually charged up to alcoholism in the death-certificates, and I have therefore adopted this plan of computing the relative percentages of alcoholic mortality in the cities and rural districts of this country.

The annual Mortality Statistics of the Registration Area

for 1908 show that in the case of 9,057 deaths either Alcoholism or Cirrhosis of the Liver was named as the cause of death, that 6,436 of these deaths occurred in cities and 2,621 in the rural districts, and that the ratios of these deaths were respectively 23.3 and 15 per 100,000 population. Applying these ratios to the urban and rural population, it appears that presumably 6,531 deaths from either Alcoholism or Cirrhosis of the Liver occurred in the Non-Registration Area in 1908, and it would therefore seem fair to assume that the 38,288 deaths in the Registration Area in which alcohol directly or indirectly figured according to the three physicians' percentage estimates presented in this paper and the probable number of these deaths in the Non-Registration Area were in about the same proportion as were the 9,057 and 6,531 deaths from Alcoholism and Cirrhosis of the Liver in these two divisions of the country. In this event, the possible alcoholic mortality of the Non-Registration Area in 1908 would have been 27,609, and the addition of this number of deaths to the 38,288 of the Registration Area would fix the presumptive mortality of alcohol in Continental United States in 1908 at 65,897. Computed on these lines the total mortality at all ages, that at ages 20 and upwards, and that in which presumably alcohol directly or indirectly figured, in the entire country in 1908, were as shown by the following tabulation:

Table IX—A Statistical Approximation of the Mortality of Alcohol in Continental United States in 1908.

Population and Mortality	Registration Area		Non-Registration Area		Continental United States	
	Number	Per Cent.	Number	Per Cent.	Number	Per Cent.
Estimated Population:						
In cities	27,588,740	61.3%	3,065,416	7.3%	30,654,156	35.3%
In rural districts..	17,440,027	38.7	38,780,807	92.7	56,220,834	64.7
Total Population....	45,028,767	51.8	41,846,223	48.2	86,874,990	100.0%
Mortality of both sexes at all ages:						
In cities	448,113	64.8%	49,792	8.4%	497,905	38.8%
In rural districts..	243,461	35.2	541,380	91.6	784,841	61.2
Total Mortality	691,574	53.9%	591,172	46.1%	1,282,746	100.0%
Mortality of both sexes at age 20 and upward:						
In cities	289,906	63.4%	32,215	8.0%	322,121	37.4%
In rural districts..	167,248	36.6	371,928	92.0	539,176	62.6
Total mortality at age 20 and upward	457,154	53.1%	404,143	46.9%	861,297	100.0%
Deaths in which alcohol may have figured as a causative or contributory factor	38,288	58.1%	27,609	41.9%	65,897	100.0%
Ratio of deaths of this class to mortality at all ages...	.....	5.5%	.....	4.7%	.....	5.1%
Ratio of deaths of this class to mortality at age 20 and upward .....	.....	8.4%	.....	6.8%	.....	7.7%
Death rate of this class of mortality per 100,000 population .....	.....	85.0	.....	66.0	.....	75.9

The net results of this pioneer effort to arrive by means of a statistical investigation at a tentative approximation of the mortality of alcohol in the United States are concisely summarized in the preceding table, and, in a word, indicate that, roughly speaking, alcohol may have been directly or indirectly responsible for about 66,000 deaths in Continental United States in 1908, or for about one in every thirteen deaths at adult ages, a figure equivalent to 5.1 per cent. of the total mortality from all causes at all ages.

CHAPTER XII

THE HIGH ESTIMATE FOR THE UNITED KINGDOM AND ITS PROBABLE BASIS

As I have noted in the early pages of this paper, in his well-known work on Alcoholism—*A Study in Heredity*, published in 1902, Mr. G. Archdall Reid says: “Dr. Ridge (Dr. James Ridge, in his ‘Alcohol and Public Health’) quotes also various attempts made by medical men to estimate the mortality due to alcohol in the United Kingdom. Some of them place the annual death-rate as low as 52,640, others as high as 120,000. It is probable, therefore that the highest estimates, based on medical returns, fall short of the actual truth. But even if only 120,000 deaths result, annually, directly or indirectly, from the use of alcohol, this would represent about one-sixth of the total mortality from all causes—a greater proportion than results from any single disease.”

Mr. Reid’s book was published in 1902, and probably the latest mortality figures for the United Kingdom obtainable when it was written were those for 1900. According to the reports of the Registrar-General, the total mortality from all causes and at all ages in the United Kingdom in 1900 was 757,732, and were the mortality of that year due to alcohol computed on the basis of the ratio of alcoholic mortality to total mortality at all ages in the United States in 1908 tentatively shown by this investigation, to wit, 5.1 per cent., the total number of deaths in 1900 due to alcohol would have been 38,644, a figure differing by 13,996 deaths from the minimum estimate of 52,640 referred to by Mr. Reid. In so far as his work goes to show, this estimate, like the maximum estimate of 120,000, was only an “estimate”, or in other words little more than guess-work. On the other hand, the conclusion of this investigation that the mortality resulting from alcohol constituted but 5.1 per cent. of the total mortality from all causes at all ages rests on the *average* of expert medical estimates for each of the 106 causes of death in which alcohol could have been even “a harmful

contributory factor". Every detail of the processes of this investigation being at once apparent, and subject to the most critical analysis, it would seem that its results and conclusions are fairly entitled to more serious consideration than is the mere unsupported maximum "estimate" on which Mr. Reid bases his conclusions that more than 120,000 deaths, or "about one-sixth of the total mortality from all causes" of the United Kingdom, result from the use of alcohol.

It perhaps is not saying too much to assert that they certainly are so entitled, pending a positive demonstration of some material error, either in the average of medical estimates for each specified cause of death or in the calculations based upon the *averages* of those detailed estimates. The fact that even Mr. Reid admits that some medical men place the alcoholic mortality of the United Kingdom at a figure differing by only about twenty-six per cent. from that which would have been shown in 1900 on the basis of the percentage showing of this investigation to some extent at least tends to confirm the approximate accuracy of the results of this investigation. And in the face of an apparent total alcoholic mortality—computed on the basis of specific figures in the case of each cause of death—of only approximately 66,000 in this country which then had a population of nearly 87,000,000, a mere "estimate" of an alcoholic mortality of 120,000, or almost twice as large, in a country with a population of barely 41,000,000, or less than one-half as large, would scarcely seem entitled to serious consideration.

In common with many other interesting writers on scientific subjects, Mr. Reid often manifests the unfortunate habit of failing to support more or less important specific allegations of fact with citations of his authorities for those statements. This annoying omission of volume-and-page references characterized, in so far as I have been able to note, his highly-interesting assertion in reference to the "various attempts made by medical men to estimate the mortality due to alcohol in the United Kingdom. Some of them place the annual death-rate as low as 52,640, others as high as 120,000."

On reading this comprehensive statement the student of the subject in search of the most exact and authoritative obtainable information immediately finds himself confronted by these inevitable questions: who were the medical men who respect-

ively fixed the mortality of alcohol in the United Kingdom at 52,640 and 120,000, how did they arrive at those specific figures, and to the mortality of what particular years did their estimates apply? On every one of those vital facts, Mr. Reid is silent, but I think I can supply the authority on which at least one of the widely-divergent figures cited by him rests—although that conclusion is mere conjecture on my part.

In 1894 the third edition of a massive work of 780 pages on "Inebriety or Narcomania—Its Etiology, Pathology, Treatment and Jurisprudence" was published in London by Dr. Norman Kerr, F. L. S., President, Society for the Study of Inebriety; Chairman, British Medical Association Inebriates' Legislation Committee; Corresponding Secretary, American Association for the Study and Cure of Inebriety," etc. The scope and tone of the work, as well as the various conspicuous positions held by its author, would seem to indicate that Dr. Kerr was one of the foremost British authorities on Inebriety, and presumably had specialized on the subject for many years. This conclusion is borne out by the fact that at least fifteen years before he had appeared before the Third Congress of the Sanitary Institute of Great Britain, held in Croydon, in October, 1879, and had there presented a paper on "Preventable Mortality—The Mortality from Alcohol." His paper is published in the Transactions of the Congress, issued at London in 1880, and thus reads in part (Vol. I, pp. 75-78):

Till about two years ago I labored under the impression that the statement, that 60,000 victims to intemperance died every year in the United Kingdom, was a wild and unwarrantable exaggeration. But on applying my own medical experience with that of several medical friends, to the total number of practitioners in three kingdoms, I was most reluctantly forced to confess that by no reasonable reckoning could I estimate our annual mortality from intemperance in alcohol at less than 120,000 souls, of whom 40,500 succumb through their own personal indulgence, and 79,500 through poverty, disease, accident or violence springing from the indulgence of others. This estimate has been widely and fully criticized all over the country, but its accuracy has not yet, I regret to say, been questioned; many high authorities such as Dr. Hardwicke, Coroner for Central Middlesex, and many well-known Medical Officers of Health having pronounced it "extremely moderate" and "far under the truth."

This computation was based on the number of medical men in practice being assumed to be 16,000; but from an undertaking recently completed, I find that the actual number is a little more than 18,000. The

same ratio as before applied to 18,000, the true number, instead of 16,000, the supposed number, would give an annual mortality of 134,499, of which 45,562 would die from personal intemperance, and 89,437, from consequences of intemperance of others.

The calculations of Dr. Thomas Morton point to a mortality of fully 60,000 while the late Dr. Lankester estimated the deaths due to excess in drink as 67,000 in 1877. My own practice during the last twelve months indicates (with every possible deduction) a mortality of 57,600.

The Dr. Morton referred to by Dr. Kerr had read a paper on "The Mortality Referable to Alcohol" before the Harveian Society, of London, in 1878, in the course of which he advanced the tentative estimate of 39,287 deaths between ages 25-75 in England and Wales as wholly or partly due to alcohol, and concluded his paper with a suggestion that an investigation of the subject be undertaken by the Harveian Society. The text of this paper was published in the *Medical Press and Circular*, of London, in its issue of December 4, 1878 (pp. 448-452), and as the Society's investigation—whose results have been summarized on previous pages of this paper—almost immediately followed, there can be little question that Dr. Morton's paper was responsible for the inquiry in question.

In his work on "Inebriety or Narcomania," already alluded to, Dr. Kerr devotes a chapter to "The Mortality from Alcohol" (pp. 476-493), and therein says:

It has been my painful duty to compute the mortality from inebriety within our borders, and the estimate which, after careful inquiry, I was enabled to lay before several scientific and learned societies, was pronounced "moderate" and "within the truth"; and has never been seriously disputed. There is first the number of death occurring annually in the United Kingdom from personal alcoholic inebriety, which I reckon at 40,000.

I arrived at my estimate of 40,000 by taking the proportion of all alcoholic deaths to all the deaths certified by me in the course of one year, and applying that proportion, with certain necessary corrections, to the total number of practitioners throughout the kingdom. This calculation I checked in a variety of ways. First, by taking the average of seventeen years' practice, comprising 278 fatal cases. Next, by the summary of the causes of 232 deaths in the practice of twelve medical men, some located in cities, and some in the country. Next, by taking out from the general mortality returns a certain proportion for alcoholic deaths in hospitals, workhouses, from violence and accident arising through drink, and for the alcoholic mortality among publicans, beer-sellers, and licensed grocers.

Dr. Wakley, M.P., late editor of *The Lancet* and Coroner for Middlesex, afforded ample corroboration of the moderation of my figures. Of 1,500 inquests held by him yearly, he attributed at least 900 to hard drinking, and he believed that from 10,000 to 15,000 persons died annually from drink in the metropolis, on whom no inquest was held. Taking London as one-tenth of the population of the United Kingdom, this would give 100,000 deaths from alcoholic indulgence over the country.

Dr. Edwin Lankester, F.R.S., Coroner for Middlesex, was of opinion that one-tenth of our entire mortality was the direct result of poisoning by alcohol; and his successor, Dr. Hardwicke, pronounced my estimate of the direct and indirect mortality from alcohol to be "far within the truth." Dr. Noble, of Manchester, believed that one-third of our disease is due to intemperance, and Sir B. W. Richardson, that one-third of the vitality of the nation might be saved but for strong drink.

It is the most natural thing in the world—not to say inevitable—that the medical specialist, like all other specialists, should be inclined to lose just a bit of his sense of proportion, and decidedly over-estimate the relative importance of his field of work, and the cause, or group of causes, of morbidity and mortality with which he is habitually dealing. I have had distinguished medical specialists frankly make this admission in conversation with me, and the general tone of the extracts from Dr. Kerr's papers which I have cited—let alone, his amazingly-high estimates of the mortality of alcohol in the United Kingdom—abundantly demonstrates that he was no exception to the specialists in general.

But, this investigation has nothing whatsoever to do with the mortality of alcohol, either past or present, in the United Kingdom, except in so far as the results of previous investigations of that mortality on the other side of the Atlantic afford some means of checking up the probable accuracy of this investigation of the alcoholic mortality of the United States in 1908. Having given in detail the authority on which in all probability Mr. Reid rested his conclusion that approximately 16 per cent. of the total mortality at all ages in the United Kingdom was, directly or indirectly, due to alcohol, it immediately becomes apparent that his conclusion was really an under-statement rather than an over-statement, if his basis was correct, for the reason that Dr. Kerr's estimate of a total of 120,000 deaths in the United Kingdom, as the direct or indirect result of alcoholic indulgence, was launched at least as early as 1879, and therefore could not have been based on

the mortality returns of the United Kingdom for any year later than 1878. Consequently, Mr. Reid's argument in 1902 that "only 120,000 deaths would represent about one-sixth of the total mortality from all causes," presumably applying as it does to the mortality of the United Kingdom in the early years of the present century, does not take into account Dr. Kerr's assumption that the number of alcoholic deaths as far back as 1878 was 120,000; and, of course, on that basis of estimate the number in, say, 1901, would have been considerably larger. In other words, Mr. Reid's final conclusion not only rests on obsolete data, but is obviously unsound in its application of returns for, say, 1878, to the mortality of, say, 1901.

However that may be, the one vital fact of his argument is, that he estimates that about 16 per cent. of the total mortality of the United Kingdom is, or was, due directly or in indirectly to alcohol; according to the results of this investigation, in the United States at least, a maximum estimate of the mortality of alcohol places it at only about 5.1 per cent. of the total mortality at all ages, or 7.7 per cent. of the total mortality at adult ages. Even the Harveian Society's investigation in 1878-82, confined as it was to the great metropolis with its enormous drinking community, suggested an alcoholic mortality of only 14 *per cent. of the total mortality at adult ages*, whereas Mr. Reid contends for an alcoholic mortality throughout the United Kingdom of *more than sixteen per cent. of the total mortality at all ages!* Taking into consideration the many important differences between the conditions of the Harveian Society's inquiry and this investigation, their respective conclusions of 14 and 7.7 per cent. of the total adult mortality as properly chargeable, directly or indirectly, to alcohol, would seem to show no wider margin of difference than might have confidently been expected.

By far the most important factor in the making of the pronounced difference in the ratios is the much higher ratio of female to male deaths attributed to alcohol by the Harveian Society's Investigation, namely, 55.26, as compared with one of only 16.54 which the presumptive figures for the proportion of female to male deaths in the Registration Area of the United States indicate. As I have shown, in Table VII, had the

Harveian ratio been applied to all female deaths at adult ages in the Registration Area of the United States, the ratio to total deaths of both sexes at adult ages of deaths in which alcohol may have figured would have been 11.2, instead of 8.4, or about one-third again as large. In view of the fact that the Harveian Society's ratio was solely based on the alcoholic mortality of the city of London, I think the following tabulation from the official reports of the Registrar-General for England and Wales substantially proves that the actual difference between the ratios of female to male mortality from alcohol in the two cases must have been quite as large, if not larger, than that indicated by the above comparison, this tabulation showing how much higher were the female ratios in question in London than in England and Wales at large in the three years ending with 1908:

Years	Deaths Officially Charged to Alcoholism and Delirium Tremens					
	England and Wales			London		
	Male	Female		Male	Female	
		Number	Ratio to Male Deaths		Number	Ratio to Male Deaths
1906	1,341	940	70.1	274	273	99.6
1907	1,328	873	65.7	249	255	102.4
1908	1,112	825	74.2	199	192	96.5
Totals...	3,781	2,638	69.8%	722	720	99.7%

The above figures show that the ratio of female to male deaths due to alcoholism and delirium tremens was invariably much higher in London than in England and Wales at large, and the average excess for the three years in question amounted to 42.8 per cent. That is to say, even on the other side of the water the female ratio was almost half again as high in the metropolis as in the country at large; and for the reasons previously enumerated, a much greater difference might be expected between the ratios of female to male deaths from alcohol if the Harveian Society's ratio for the London mortality of a generation ago were to be compared with that for the mortality in the Registration Area of the United States in 1908.

The other conspicuous—but less important—factor in ac-

counting for the much lower apparent mortality from alcohol in this country, is the large percentage of rural mortality which enters into these calculations, whereas in the case of the Harveian Society's investigation only urban mortality was considered. In the Registration Area of the United States in 1908 the ratio of deaths due to alcoholism and cirrhosis of the liver combined, was only 15 per 100,000 population in the case of the rural population, as compared with 23.3 per 100,000 in the Registration Cities. That is to say, the city death-rate from alcoholism and cirrhosis of liver was more than half again as high as the rural death-rate from these causes, and of course that fact would mean a notable decrease in the alcoholic death-rate for the entire country as contrasted with that for London, or any other great city. Leaving out all other clearly-defined differences between the conditions of London in or about 1880 and the United States in 1908, the two factors named fully account for most—if not all—of the difference between the Harveian Society's assumed ratio of 14 per cent. and this investigation's conclusion of 7.7 per cent. as indicative of the proportion of all deaths at adult ages directly or indirectly due to alcohol in London in 1880 and in Continental United States in 1908.

CHAPTER XIII

CONCLUSIONS

IN default of proof positive to the contrary, it would therefore seem entirely safe to assume that the total annual mortality of Continental United States in which alcohol directly, indirectly, or even remotely, figures as a causative or contributory factor at last reports did not exceed the 66,000 deaths approximately suggested by this investigation. It should be clearly understood that this figure by no means signifies that alcohol was the direct cause of 66,000 deaths, the number in question presumably including all of the deaths in which alcohol played any appreciable contributory part. Consequently the number of deaths thus computed is not properly comparable with the number of deaths accredited to any particular cause in the annual Mortality Statistics of the Registration Area, as in every case those figures deal with deaths immediately due to the cause named.

For instance, in 1908 there were 67,376 deaths in the Registration Area listed as due to Tuberculosis of the Lungs, 60,038 as due to Heart Disease, and 44,501 as due to Pneumonia (lobar and unqualified). Were the mortality records for the entire country available, the total number of deaths assigned to each of these causes would probably be all but twice as large, respectively standing at about 130,000 for Tuberculosis of the Lungs, 116,000 for Heart Disease and 86,000 for Pneumonia, should the rates for the Registration Area obtain throughout the country at large. Unquestionably many thousands of deaths would have to be added to these figures in each case, were all the deaths in which Tuberculosis, Heart Disease or Pneumonia "directly, indirectly, or even remotely figured as a causative or contributory factor" taken into account; and, as the approximation of the mortality of alcohol has been computed on that basis, manifestly the figure thus arrived at cannot fairly be compared with the returns for any other cause of death unless they have been worked out on a similar basis. This fact must be taken into account in interpreting the

real significance of the approximation of the mortality of alcohol deduced from this investigation, or utterly misleading conclusions will be drawn.

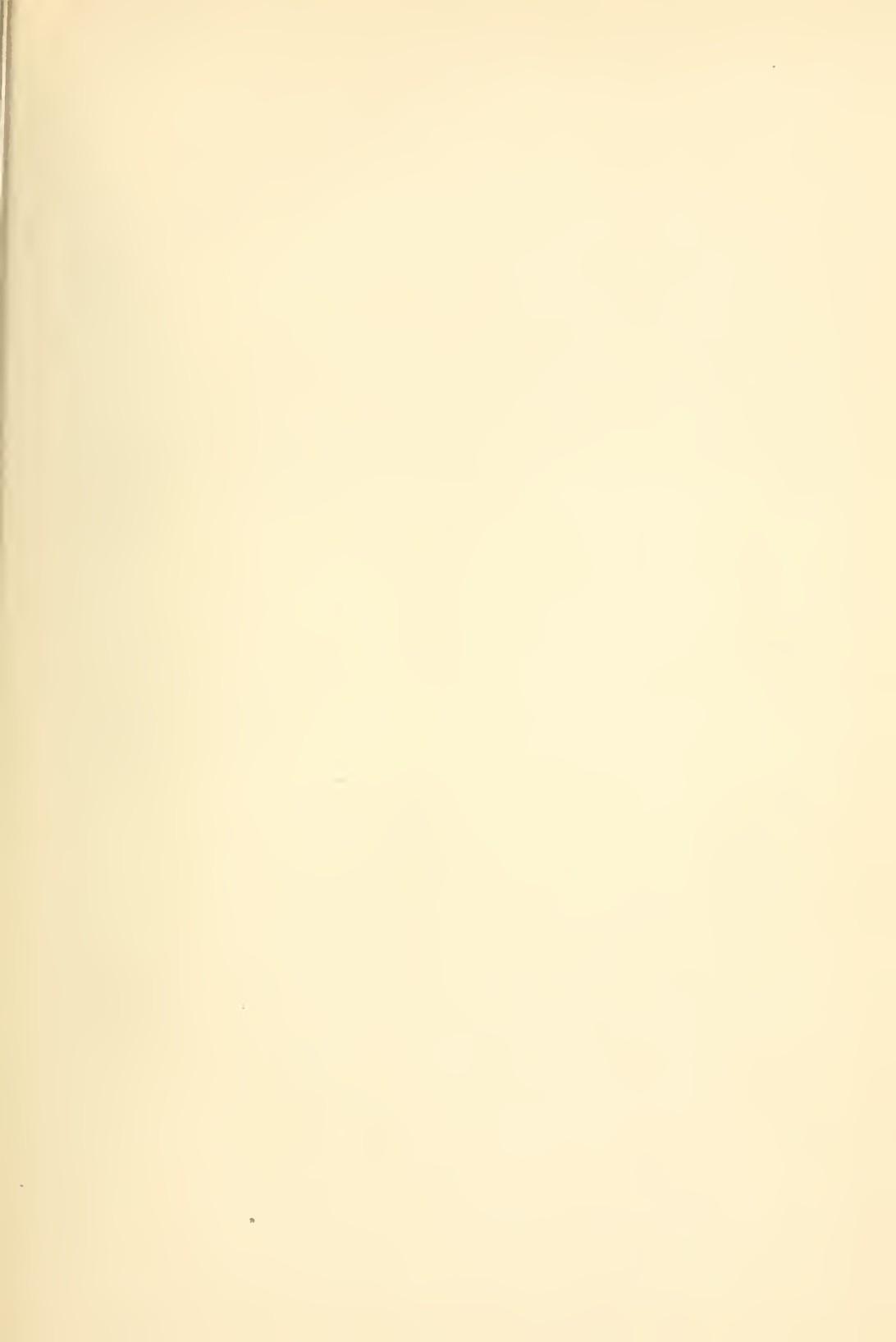
It is in no sense a reflection on the hypothetical figures deduced from the percentage estimates of the medical directors who have coöperated with this investigation to say that the experience of medical directors of all life and health and accident insurance companies—industrial companies alone excepted—in the main is with the wealthy or fairly well-to-do classes, and that physicians so situated are comparatively rarely brought in contact with the lives and habits of the laboring and unskilled wage-earning class, who constitute so large a percentage of the total population. In his recently-published study of "Wages in the United States—1908-1910" Dr. Scott Nearing says (on page 213): "A study of classified wage statistics shows that half of the adult males working in the industrial sections of the United States receive less than \$600 per year; three-quarters are paid less than \$750 annually; and less than one-tenth earn \$1,000 a year. These figures are not accurate, however, since they are all gross figures—including unemployment. They should be reduced, by, perhaps, 20 per cent. Making, therefore, a reduction of one-fifth, it appears that half of the adult males of the United States are earning less than \$500 a year; that three-quarters of them are earning less than \$600 annually; that nine-tenths are receiving less than \$800 a year; while less than 10 per cent. receive more than that figure."

As a matter of course, wage-earners annually receiving, say, only \$600 or less a year cannot to any large extent take out insurance in companies other than industrial. Therefore, however extensive may have been the experience of the Medical Directors of large insurance companies—not industrial—with the lower classes in hospital and clinical work prior to the attainment of their insurance-official positions, the present-day experience of medical authorities of this order must necessarily be with a more fortunate class of humanity. The estimated percentages of deaths from various causes directly or indirectly due to alcohol on which the statistical conclusions of this investigation rest are based on the experience of the medical directors whose kind assistance alone had made possible the investigation; and, though undoubtedly each of them has aimed at making his estimates of sufficient breadth to include all classes of the community, his latter-day ex-

perience would be bound to preponderate. It is inevitable that near-by objects will always command first attention.

For these reasons I believe it would be practically impossible for a city physician—even for the medical director of a great insurance company writing business in all sections of the country—almost entirely dealing with at least the fairly well-to-do class, to make full allowance for the conditions of rural as distinguished from city life, and for the part which bad housing, poor food, and various other features of tenement-house life play in the mortality of the least fortunate element of the cities' populations. I am personally inclined to believe that unfavorable sanitary conditions of rural life are more than offset in so far as the probable effects of alcohol in the case of that community are concerned by the manual employment in the open air of a large percentage of the country population; and perhaps many deaths in the very poorest urban class for which alcohol was apparently responsible would more properly be chargeable to wretched housing, wretched food and wretched environment, rather than to alcohol. In so far as the relative effect of alcohol on rural and urban communities is concerned, there seems to be no serious question. I have squarely put to various physicians the question as to whether a given per capita allowance of alcohol for any particular period would probably operate less favorably on city folk or country folk, and all have held that it would more injuriously affect city folk.

In conclusion, it would seem that in all probability the approximate total of 66,000 deaths assumed to be the mortality directly or indirectly due to alcohol in this country in the year 1908 is not only an outside figure, but possibly one somewhat in excess of the real number of deaths which would properly be so chargeable if there were any means of measuring the actual experience of the nation. Apparently, not more than one in thirteen deaths *at adult ages* is even remotely attributable to alcohol—instead of the one in six deaths *at all ages* which Mr. Reid and some other writers on the subject would have us believe are so chargeable. The conclusions of this paper have been reached by clearly-defined statistical processes, every detail of which may be critically examined, and accepted or rejected, whereas practically all of the preceding figures of the last twenty-five years have been mere generalizations. Which conclusions are fairly entitled to the greater credence?







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